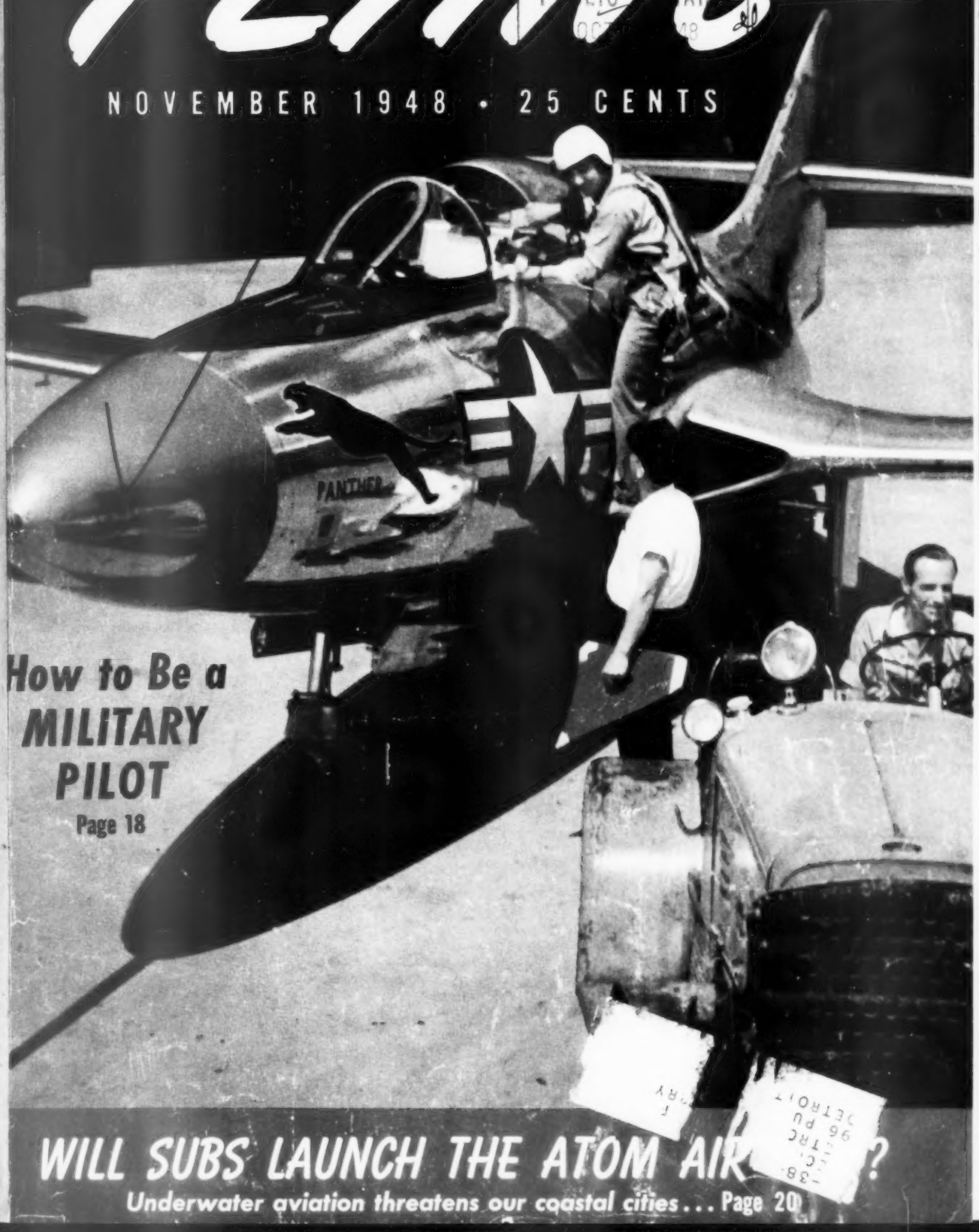
TECHNOLOGY DEPARTMENT

FLYING

NOVEMBER 1948 • 25 CENTS

F-86-World's Fastest Fighter - Page 15



How to Be a MILITARY PILOT

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WILL SUBS LAUNCH THE ATOM AIR[illegible]?

Underwater aviation threatens our coastal cities . . . Page 20

Aeromatic® out-performs them all in split-second emergencies...

Four Lives and a new ship were at stake . . . but the *automatic* action of the AEROMATIC Propeller gave pilot Faulkner split-second full power with flat pitch. Split-second, automatic pitch is what counts in emergencies . . . it counts in normal operations, too.

POWER LINES cut his final approach at the last minute! The pilot, Mr. Edward Faulkner, president of Faulkner Aviation Industries, was really up against it! He had a full load, no wind and an air speed of only 60 MPH! Here's his own story of what happened . . .

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THE COVER: Grumman XF9F-2 (Panther), Navy carrier-based jet fighter, at Bethpage, L. I., plant. Photo by Harold G. Martin.

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FLYING

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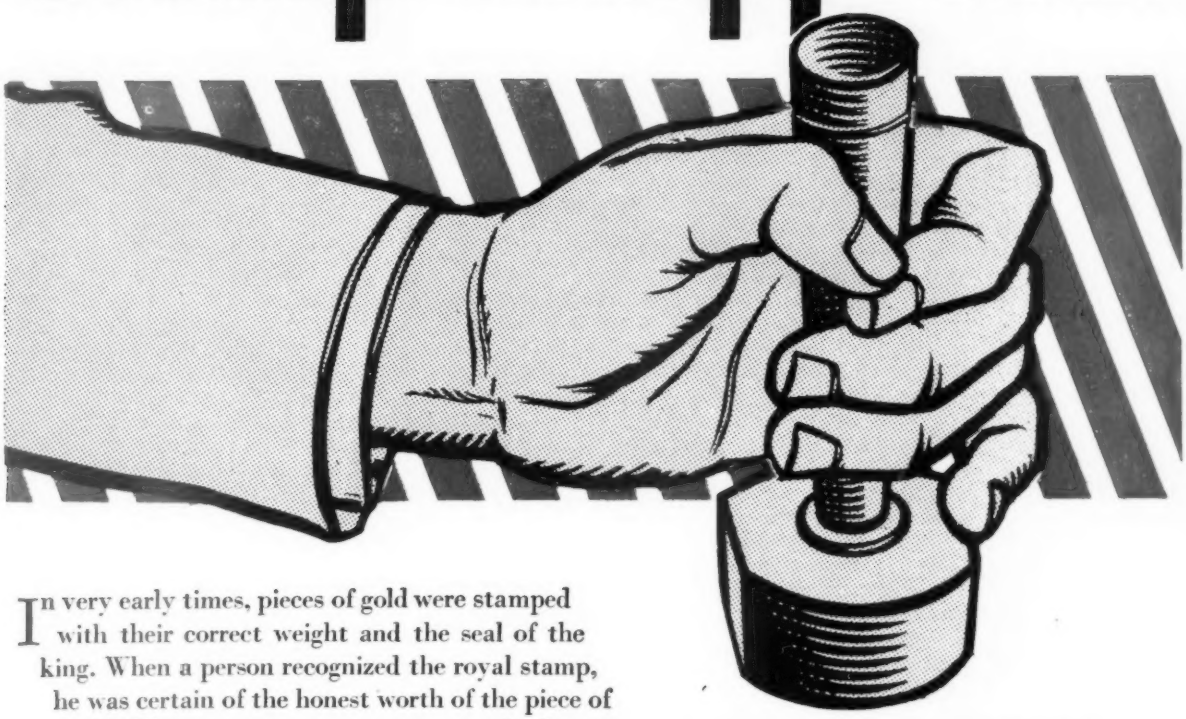

In very early times, pieces of gold were stamped with their correct weight and the seal of the king. When a person recognized the royal stamp, he was certain of the honest worth of the piece of gold. Thus, many, many years ago, the "stamp of approval" had its origin.

Today, also, the "stamp of approval" on any product has a definite... if intangible... value. It is a significant fact that many of the leading commercial air lines have placed their "stamp of approval" on Phillips 66 aviation products. Yes, their use of Phillips 66 high-octane aviation fuel and Phillips 66 aviation lubricants is your assurance of the reliability and worth of these products.

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Phillips 66

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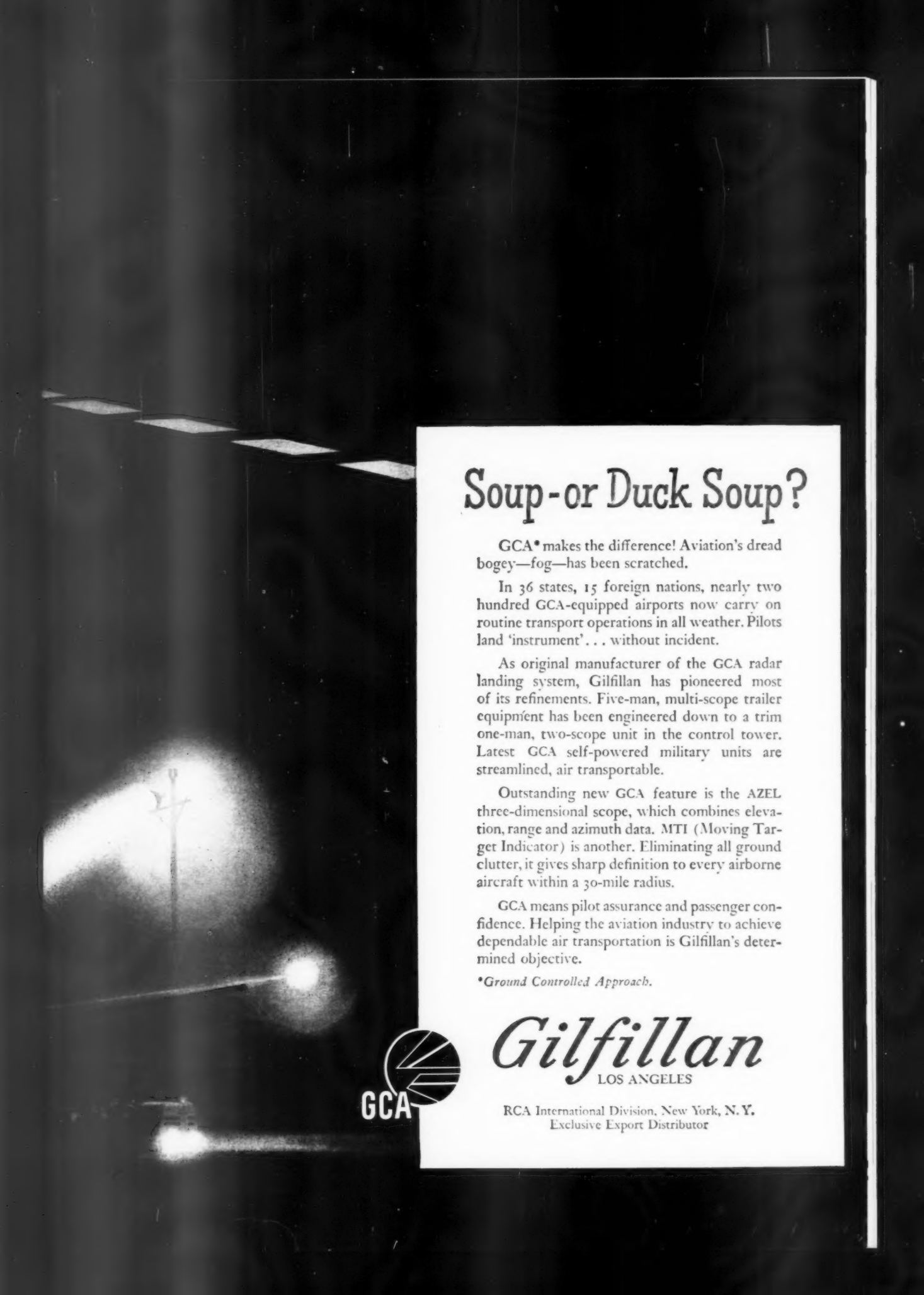

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THE MAIL BOX

8091 or 1608?

Please tell me whether the large number on the landing field on FLYING's September back cover should read 8091 or 1608. [See photo.]

Don't regard my natural curiosity as unimportant. If you don't remove my doubt, I'll always be perplexed until I find someone who can answer the question.

GUILLERMO HERNANDEZ

Chicago, Ill.

. . . caused blind fury.

. . . the figures 80 and 91 by the Louisiana Flyers Hangar here at Lake Charles were originally intended to indicate to passing aircraft that we had 80 and 91 octane fuel available. However, these numerals have caused much confusion . . .

One day in desperation I put a small sign "TOP" over the numerals to indicate the correct direction for reading. You can imagine my great distress to find that "TOP" when read upside down read "POT." Needless to say, this aggravated an already desperate situation. The following day in blind fury I ordered a bulldozer to cover up the sign and since then have been doing my best to forget it . . .

WILLIAM A. ROSE
President, Louisiana Flyers
Lake Charles, La.

RIGHT MAN, WRONG AIRLINE

Just finished Ted Patecell's good article, "This Is Skyway One," in your August FLYING. But when did he start flying with American Overseas Airlines?

KERMIT DUNKLIN

Brooklyn, N. Y.

● Pilot Patecell was incorrectly identified as an American Overseas Airlines flyer. He is a pilot for Pan-American Airways.—ED.

STARTLED READER

I was surprised to read in "Jap Bait" [July FLYING] of the part the U.S.S. Calhoun played in the rescue of Lieut. Junie Lohan, a Marine flyer shot down in the Pacific . . .

I was a fire controlman aboard the Calhoun at that time, and often wondered if Lieut. Lohan got off safe. His story of what happened that day was very accurate.

CLAIR H. DEAN, SN

Milton, Fla.

THE McKELLAR PLANE

. . . Practically all the credit has been given to Jack Northrop and his company for the development of the split type aileron.

I am reminded of experiments and successful flight of a flying wing conducted under the guidance and supervision of Mr. J. D. McKellar [who] designed this wing while he was professor of aeronautical engineering at the California State Polytechnic College in San Luis Obispo, Calif. . . . The flying wing was successfully flown by a pilot in the month of August, 1940. However, the wing was destroyed in a landing accident when it struck a large boulder on the airport. Due to insufficient funds, the wing was not repaired and work ceased. The wing was powered by two 50-h.p. Continental engines, one tractor and the other pusher.

Did Mr. Northrop acquire Mr. McKellar's patent?

ROBERT COSTELLO

Lieut. Col., Air Force Reserve

Bogota, Colombia

● Yes, in October, 1945. McKellar's control device, however, is not used in normal flight control of Northrop flying wings. There is only a remote possibility, say Northrop engineers, that a modification of the McKellar device would be used for normal control in extreme emergencies, but this modification is built into the wing and used for the trim control. Basic control devices on the Northrop flying wing were developed and patented by Northrop.—Ed.

. . . McKellar's flying wing.

INTERNATIONAL CHESS

Re: "Strategy Against the Soviets" [September FLYING].

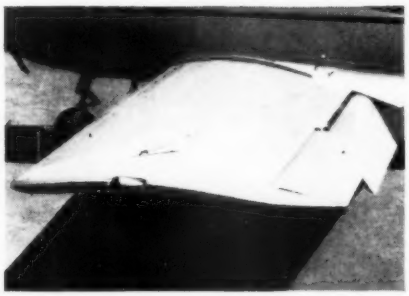
Thanks for using "Soviets" instead of Russia. As a Russian-American (Pursuit Squadron commander in Russian Imperial Air Force during World War I with 667 missions and 978 hours in combat) let me express my opinion on your article.

My American friends and business as-

(*Continued on page 76*)

CHECK THESE NAVION FEATURES

1 SELECTIVE TWO-CONTROL gives automatic coordination. Patented inter-connected aileron and rudder control permits steering with wheel alone. But you have rudder when you want it. *Navion* flying is easier, safer...pleasantly relaxing.



2 HIGH-LIFT FLAPS. Large, slotted, full-deflection flaps give the *Navion* slowest, shortest landings of any plane in its class. Roll only 335 feet. Stall-resistant wing gives full aileron control for maximum safety in slow flight and landings.

3 FULL-VISION CABIN. Here's visibility designed for Sunday traffic. Seven large, clear windows let you see in every direction. No blind spots while flying or taxiing. You can even use a rear-view mirror . . . see 12° down over *Navion* nose

4 THICK-SKINNED RUGGEDNESS. The all-metal *Navion* takes heavy duty assignments in stride. Sturdy construction and thick-skinned wings, fuselage and tail assure safety and low maintenance cost. For permanent beauty, durable enamel finishes now standard...choice of 4 striking colors.

5 LARGE, STEERABLE NOSEWHEEL. Easiest, safest ground handling under all conditions. *Navion's* over-size tires, sturdy tricycle landing gear, wide wheel tread and high speed ground clearance make rough fields and cross-wind landings a cinch. Extra powerful, equalized hydraulic brakes.

6 ROOMIEST CABIN. Quiet . . . well-ventilated ...smartly styled. Elbow and leg room to spare for all four passengers. Adjustable front seats. *Navion* cabin, 42" wide; 94" long; 52" high. Canopy rolls open 2½ feet for more convenient entrance and exit. Baggage space up to 180 pounds.

7 FLEXIBILITY OF PERFORMANCE. 150 mph. cruising speed. 750 mile range with optional reserve tank. Easiest air ride. No tail wagging, even in rough air. No other plane offers such intelligently chosen and well engineered combination of features. For illustrated booklet, demonstration or free business trip, write us today, on your business letterhead!

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NOTES ON PRIVATE FLYING

. . . **Lowest transatlantic air fares** have been established by Scandinavian Airlines. Round trip, New York to Copenhagen or Oslo is $541.30. Sleeping accommodations are available for an extra $45.

. . . **Carl Steph**, Oroville, Calif., who has been conducting excursion flights to Mt. Rainier, Mt. St. Helena, Mt. Adams and Mt. Hood for 20 years, has prepared a series of forms showing the heading, true course, variation, and distance to landing fields within easy range of 12 key mountain peaks in the area between Mt. Shasta, Calif., and Mt. Stuart east of Seattle. Charts accompany the forms. They help pilots above the overcast identify mountain peaks and choose fields east of the peaks which are usually open.

. . . **Skeptics** who have whispered that the Beech *Bonanza* can't "take it" would have been forced to eat their words if they had seen Bevo Howard's maneuvers with standard production model D-1601 at the National Air Races. Howard did a series of slow rolls, two inverted slow rolls, an eight-point roll followed by a slow roll, a loop, Cuban eight followed by a slow roll, inverted flight, and an Immelman followed by a snap roll in the *Bonanza*. In one inverted dive the plane had a true airspeed of 240 m.p.h.

. . . **Flottorp** Manufacturing Company has started production of a new propeller coated with an abrasion resistant plastic. Test barrages of sand and gravel hurled against the propeller did not scratch it.

. . . **Unusual aviation promotion** campaign has been put on by a Chicago television program over station WBKB. The American Tele-Flyers have been written, acted, and so far financed by ex-Liaison Pilot Hill Carruth, his wife, Ex-Wasp Beverly Carruth, and Phill Groh. Their experience so far has convinced the Tele-Flyers that people can actually be taught to fly by television.

. . . **Keystone Airpark** and Ranch, near Keystone Heights in the Florida Ridge area, opened in October. Besides full airport facilities, and being the home of Florida Aviation Academy, the field will feature a Skytel and sports, including soaring, fishing, swimming and quail and duck hunting.

. . . **The Mooney M-18** single-seat 26.5-h.p. lightplane recently has received its CAA production certificate. The plane is powered by a Crosley **Cobra** engine. Sea level cruising speed is 85 m.p.h., price $1,600. Plane is manufactured by Mooney Aircraft, Inc., Wichita, Kans.

. . . **More Cessna 170** four-place planes (123) were manufactured during August than any other model. Twelve manufacturers produced 685 planes, of which 448 were four-placers, and only 233 were two-placers. Four three-placers were built.

. . . **Consolidated Vultee** Aircraft Corp. has officially discontinued its flying automobile projects. Rights and patents have been released to the craft's designer, T. P. Hall, who has left Convair and plans to continue development of the four-place car and its detachable wing on his own.

. . . **Amazing demonstration** of efficient air and ground traffic for lightplanes was seen at the National Air Races at Cleveland. A fleet of 16 follow-me Jeeps met the planes as they arrived and led them to the parking area. Here ground crewmen flagged each to its designated tie-down. Service Jeeps tied down the planes and refueled them, and the entire parking operation was directed from a Jeep with two-way radio. When the 2,300 personal planes left after the final race, they took off from the turf as thick as ducks rising out of a marsh.

American Tele-flyers over WBKB, L. to R., **Hill Carruth**, Phill Groh, Beverly Carruth.

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MILITARY NEWS

. . . **USAF** has introduced 13 new models of aircraft during the past year, including four fighters, three transports, two bombers, a high-speed trainer, a pilotless jet target plane, a helicopter and a cargo glider. Included are TF-80, XF-85, F-86, F-87, XB-47, B-49, C-119, C-121, XC-99, XC-120, XH-12, XQ-2, CG-18A.

. . . **Lockheed** and Air Force engineers are considering lengthening the fuselage of future F-80s. In designing the two-seat TF-80 trainer, Lockheed found that adding three extra feet of fuselage made a cleaner, faster airplane.

. . . **Turbo-jet** aircraft engines being built by Allison now produce 64 per cent more take-off thrust per pound of engine weight than the original models placed in production in 1945.

. . . **A growth** of 89,000 officers and enlisted men is recorded by USAF in the first year of its existence. On September 18, the first anniversary, there were more than 400,000 men and women in the Air Force, approximately 130,000 of whom were stationed overseas.

. . . **What's happened** to the Boeing XB-47? Two have been completed and are in advanced flight test. Second flight testing has been completed. There is a possibility that the plane will go into fairly large scale production soon.

. . . **The McDonnell XF-85** has completed its first powered flight at Muroc, Calif. Flight characteristics are reported to be excellent but there was some difficulty recapturing the plane. It is designed to be carried in the No. 1 bomb bay of the Convair B-36. It cannot land on the ground, but must hook onto its mother plane in flight. Tests are underway with a modified B-29 as mother plane.

. . . **The all-weather airline**, operating between Clinton County Air Force Base, Wilmington, O., and Andrews Field, near Washington, has terminated its full-time operation after two years of flying a perfect schedule through all types of weather.

. . . **The Marquardt M-14**, first helicopter to be powered by a pulse-jet engine, has been test-flown successfully. The pulse-jet power plants, working on the same principle as the engines which powered the German V-1, are mounted on the tip of each rotor blade. Engines are eight inches in diameter and have reed-like valves at the air inlet which close with each explosion. The craft weighs only 1,000 pounds gross.

. . . **A new order** for 154 Convair L-13 liaison planes has been awarded by the Air Force, raising the total on order to 300. About 50 existing models of the L-13 have been grounded for months

because of defective operation of a crankshaft dampener, causing excessive crankshaft vibration.

. . . **Thirty-six landing lights** of 3,300,000,000 peak candlepower each, plus 35 lights of lesser brilliance, will be tested at the armed forces Landing Aids Experiment Station, Arcata, Calif. The 71 lights will be lined up in a row two-thirds of a mile long, and will produce lightning-light flashes to guide fog-bound pilots to the Arcata airfield runway. The brilliant light source is a krypton flash unit, developed by Westinghouse. The lamp is only four inches long, a slender quartz tube filled with the rare gas krypton. When the power is on the lamps flash with a brilliance of 10,000,000 candlepower per square inch—10 times that of the sun.

. . . **The Air Force** has ordered 158 Ryan *Navions*, bringing the total procurement of this type to 241, plus components and spares with a dollar value equal to another 60 complete *Navions*. The *Navion* is designated L-17A and L-17B and is used as an "all-service" plane by the Air Force.

. . . **Navy** has let a contract to Goodyear Aircraft Corp. for a 324-foot "N"-type blimp, nearly twice the size of anti-sub blimps of World War II.

. . . **British** aircraft were shown at the annual display of the Society of British Aircraft Constructors at Farnborough early in September. Planes included the Gloster *Meteor*, de Havilland *Vampire*, Supermarine *Attacker*, Hawker N7/46, Gloster Ei/44, Saunders-Roe SR/A1 fighter, Supermarine *Seagull*, and such commercial models as Hermes IV, Airspeed *Ambassador*, Vickers *Viscount*, Armstrong-Whitworth *Apollo*, Short *Solent*, Short *Sealand*, and others.

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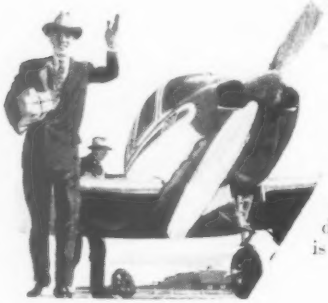
"We deal in 'out-size' products, such as trailerized truck tanks," says J. K. Downer of Scientific Brake and Equipment Company, Saginaw, Mich., "and our sample case would fill freight cars. We pick up distant customers with our four-place Bonanza, bring them over for plant inspection and return them in hours. Sales are easier to make. We get to know our customers better, too." All this at the Bonanza's amazingly low operating cost—measured in pennies per mile.



"One of our agricultural machinery customers was combining wheat in Texas when he needed parts—fast," reports A. A. Dryden, president of Oberlin Motor Company, Oberlin, Kansas. "He was 520 miles away, but our four-place Bonanza got parts there three hours after his call. When we give service like this we *keep* our customers, even though other distributors are nearer. Our Bonanza is a real sales tool!"

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BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

FLYING
NOVEMBER • 1948

F-86 —World's Fastest Fighter

George Welch, who first flew the F-86, taxies it for take-off. Note the wing leading edge slots for slow-speed flight.

By GAITHER LITTRELL

Contributing Editor of FLYING

THE F-86 is the fastest fighter plane in this country and undoubtedly in the world. It reportedly has dived faster than sound. Only bad luck prevented it from setting an official world's speed record before thousands of spectators at the National Air Races September 5, when Maj. Richard L. Johnson flew the plane an average of 669.4 m.p.h. But the record could not be official because of technicalities. Rules of the *Federation Aeronautique Internationale*, official record governing body, require four passes of the three kilometer course, each timed with high speed cameras. Johnson made six passes but the cameras missed three of them.

Only 10 days later, however, on September 15, Johnson did break the official record with 670.981 m.p.h. And this time the cameras didn't miss. His speed was more than 20

m.p.h. faster than the mark set in August, 1947, with a Douglas *Skystreak* (D-558).

Major Johnson flew a standard and fully-armed production fighter plane. Not only is this the first time that a production model, ready to fight, has held the world speed record, but Major Johnson said that he did not use full throttle. Potential speed is considerably faster.

There are other outstanding features in this revolutionary fighter. It has wings swept back at an angle of 35°. It has the most powerful jet engine in production—the General Electric TG-190 (J-47) which develops over 5,000 pounds of thrust, equivalent to approximately 10,000 horsepower at the plane's top speed.

Nor is this all. The F-86 reportedly was dived faster than sound early this year when it was equipped with a GE-Allison J-35 (TG-180) axial-flow turbojet. Today, the plane has a GE J-47 (TG-190) engine which with water-injection can equal the 6,000 pounds thrust of the X-1. And even more powerful engines are planned for the F-86 in the future.

The Air Force has not admitted officially that the F-86 passed the speed of sound (763 m.p.h. under standard conditions at sea level). Several months ago when the rumor was printed, official Washington headquarters made somewhat ambiguous denials. North American kept mum, probably because its tongue was caught in its cheek.

But it seems true that George Welch, top fighter-type test pilot at North American, dived through the sonic barrier not once but several times. Welch says nothing except, "I'm not permitted to discuss this with anyone."

So far, the only plane USAF officially admits has passed the sonic barrier is the Bell X-1, a rocket-powered research plane. The X-1, however, is a much smaller plane which has a powered flight duration of only a few minutes, compared with the F-86's top speed endurance of one hour. Without water injection, the F-86's TG-190 engine develops over 5,000 pounds of thrust, giving it a range of over 1,800 miles at reduced speed. (Range of the X-1 is about 100 miles.)

The F-86 is no hot-house flower. It is a rugged operational aircraft. Nearly 700 of these are on order. This is in contrast to the X-1 and the D-558-1 *Skystreak*, both experimental research craft which will never go into production.

Test Pilot Welch says he likes "everything" about the F-86, first operational U. S. craft to have sweptback wings and empennage.

"The plane's so clean you never have trouble," says Welch. Both the sweepback of the wings and the superfinished surface "reduce drag to a minimum—and you don't have to worry about effects of compressibility shock waves."

Welch, who shot down 18 Jap planes in 33 months after Pearl Harbor, was released to North American late in the war to advise on development of the *Mustang* and *Twin Mustang*. Later, he was project pilot on the North American Navy FJ-1 jet job, the SN-2-J trainer and the F-86.

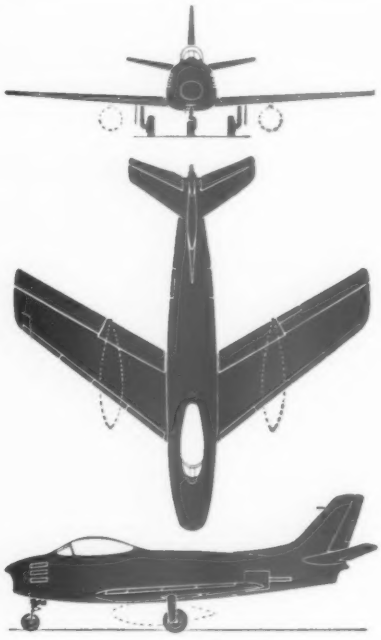
He flew the F-86 on its maiden hop (October 1, 1947) and took the XF-86A with the new TG-190 engine aloft last May 18. On more than 250 flights with the fighter he has logged over 200 air hours.

"It's the easiest fighter I ever flew," he says, "—stable and without any bad characteristics. The rate of roll is terrific and the plane's highly maneuverable at altitude. Stall characteristics are good and it's impossible to make a bad landing, even though landing speed is higher than in other planes."

Welch personally conducted all dive and spin tests, starting spins at 30,000 feet and losing from 3,000 to 4,000 feet in each turn. Yet recovery was "easy when pressure on the elevators was released."

Main difference between the F-86 and most conventional planes, according to Welch, is the high angle of attack at take-off. "It seemed at first that the nose was pointed too high into the air and that I might stall. You soon get used to it, though."

It's no secret around the North American plant that the decision to use sweptback wings came as a result of cap-



F-86 IN SILHOUETTE

World record holder, Maj. Richard L. Johnson is congratulated by Gen. George C. Kenney after setting unofficial speed record at Cleveland. Malfunction of cameras invalidated this mark, but a few days later, on September 15, Major Johnson established a new official record in the F-86 at Muroc Air Base, Calif. He flew the swept-wing Air Force fighter 670.981 m.p.h.

Speed is epitomized in the lines of the F-86. Not only the wings but the empennage surfaces are swept back. Cockpit dome is made of curved glass.

tured Nazi aeronautical data and studies. A. F. "Tony" Weissenberger, F-86 project engineer, freely admits the idea came from the Germans.

Originally, the plane was designed with straight, conventional wings. This version was carried into a finished mock-up before the sweepback was decided upon, and the Air Forces had okayed construction of three straight-winged F-86s. This order was rescinded, however, after four small teams of North American engineers agreed that sweepback would be superior.

Details of armament, fuel compartmentation, radar and other equipment in the plane are still classified. But the F-86 is reported to be able to carry six .50-caliber machine guns, a variety of aircraft rockets, several light bombs or two 1,000 pound bombs, additional machine gun packages or jettisonable fuel tanks.

Features of the plane include wing leading edge slots, required to solve the problem of low-speed operation in a high-speed airplane. They extend and contract automatically, according to pressure encountered on the super-thin wings. There is an adjustable stabilizer, a new-type fuselage brake and enclosed antennas.

The horizontal stabilizer may be adjusted by the pilot so that the angle of incidence is altered by as much as 11°. A button on the stick does the trick. This makes possible the small tail the F-86 carries, giving it better flying qualities and better control in the transonic speed range.

New air brakes consist of two simple bars on either side of the fuselage. They may be extended or contracted at the will of the pilot for improved flight control during combat or during landings.

Structure of the F-86 is double aluminum skin with hat sections between layers, replacing the conventional rib and stringer construction. Double skin extends from the center section to the outboard edges of the outer panel.

Tapered skin construction also is employed. At sections where thickness is needed for strength, the aluminum is thick. It then is tapered down to sections where strength requirements are less critical.

This created a fabrication problem for North American production chiefs which was overcome with the building of special milling machines. Company executives say that tapering does not slow production. Benefits are in reduced overall weight.

Even at that the F-86 has a gross weight of 13,715 pounds. It is 40 per cent heavier than the P-51H.

The fuselage is divided into two main sections joined aft of the main wing with four bolts. Removal and replacement of the jet engine may be accomplished in less than 30 minutes as a result. There also is quick access to all control cable lines.

The plane incorporates an ejection seat, pressurized cabin, a refrigeration system for transonic flight, radio and radar navigational aids.

"How we were to get all of the necessary equipment into this plane and still have a fuselage shaped for low drag to meet the competition of the F-80s and F-84s had us worried," admits Weissenberger, the project engineer.

"One thing we discovered was that, by placing the big intake duct down the middle, the shape of the F-86 became deceptive to the eye. The drag force actually became only the drag of a tube. That made it possible for us to go larger on the fuse- (*Continued on page 43*)

HOW TO BE A

NAVY

THE NAVY'S aviation cadet program is booming these days. Growing emphasis upon sea-air power recently caused the Navy to reactivate flight training, offering qualified men the opportunity to become officer pilots in the world's most powerful fleet.

To enlist as a Naval Aviation cadet, Class V-5, U. S. Naval Reserve, you must agree to serve four years on active duty unless released sooner by the Navy Department. This includes approximately 18 months of flight training and a period of service with the fleet, dependent in length upon the Navy's needs and your desires. Upon completion of flight training you will be designated a Naval Aviator and will be commissioned either as an Ensign in the Naval Reserve or as a Second Lieutenant in the Marine Corps Reserve.

After four years of service, you will be released to inactive duty or—should vacancies in the service permit—you may be authorized to continue on active duty.

As a cadet, you'll receive $75 per month, lodging, board, and a $180 uniform allowance. In addition, the premiums on $10,000 worth of Government Life Insurance will be paid by the Navy during your entire period of flight training. Upon commissioning, this insurance may be continued at your own expense. The minimum pay and allowances of an unmarried ensign or second lieutenant in the Marine Corps amounts to $291 per month. After commissioning, if you should marry, the Navy recognizes your greater responsibilities, and increases your allowances $81 per month, for a total of $372.

Actual flight training in the Naval Aviation cadet program requires about 15 intensive months which, added to processing and indoctrination periods, changes of station and leave, totals about 18 months. Your first taste of life as a Navy flyer will be at Pensacola, Fla.—the Annapolis of the Air. Pre-flight training of about 16 weeks includes the principles of flight theory, navigation, aerology, and aviation communications, as well as a basic military and athletic program.

Next comes basic flight—about eight months of learning to fly in the Navy's sleek two-place basic trainer. Ground school courses continue, but you spend some 180 hours in the air and learn formation, cross country, night and instrument flying. Finally, you make your first landing on the deck of an aircraft carrier. Then you go either to Jacksonville, Fla., or Corpus Christi, Tex., for four months of advanced training in combat type planes. If possible, you are given your choice between specializing in the Navy's two- and four-engined aircraft, or in single-engined carrier-type planes. If you are selected for multi-engine training, you put in about 150 hours of air time, and then are ready for assignment to a fleet operating squadron. Single-engine pilots log 115 hours, then return to Pensacola for an additional two-week qualifying course in carrier deck landings, following (*Continued on page 76*)

The air services are expanding and there's room

MILITARY PILOT

AIR FORCE

WANT to fly the U. S. Air Force's new giant B-36 bomber? Or the lightning-fast F-80, F-84 and F-86 jet fighters? You can. All you have to do is meet the qualifications for aviation cadet training and win your wings as an Air Force flying officer.

Here's how to go about it.

If you are an unmarried male citizen, will agree to remain single during the 52-week training period, and will be between 20 and 26½ years of age at the time of acceptance for training, you can apply. You can get application blanks at any Air Force Base or recruiting station, or you may write direct to the Chief of Staff, Headquarters, U. S. Air Force, Attention: Aviation Cadet Section, Washington 25, D. C.

If your application is in order you will be notified to report for qualifying exams at one of 60 Aviation Cadet Examining Boards located at Air Force Bases throughout the United States. First you will get a complete physical check-up by Air Force flight surgeons. Your eyes, ears, heart and teeth must be normal. You must also get a normal rating for color and night vision, respiration, muscular coordination, physique and nervous system. You may measure from 64 to 76 inches in height and weigh from 130 to 200 pounds.

A three-hour written test is the next item on the examiners' agenda. This measures your knowledge of aviation and your aptitude for flying. If you read aviation magazines, understand some of the theories and mechanics of flight, and know a little about the history of aviation, you shouldn't find the 150 multiple-choice questions too difficult.

If you don't have one-half or more of the credits necessary for a degree at an accredited college or university, you will be required to take a stiff two-hour mental exam heavy with questions on mathematics and physics. This multiple-choice test will also record your knowledge of English grammar and composition, American and world history, geography and current events.

The Air Force will also investigate the references which you are required to have and you will be called before a panel of officers to answer "personality" questions.

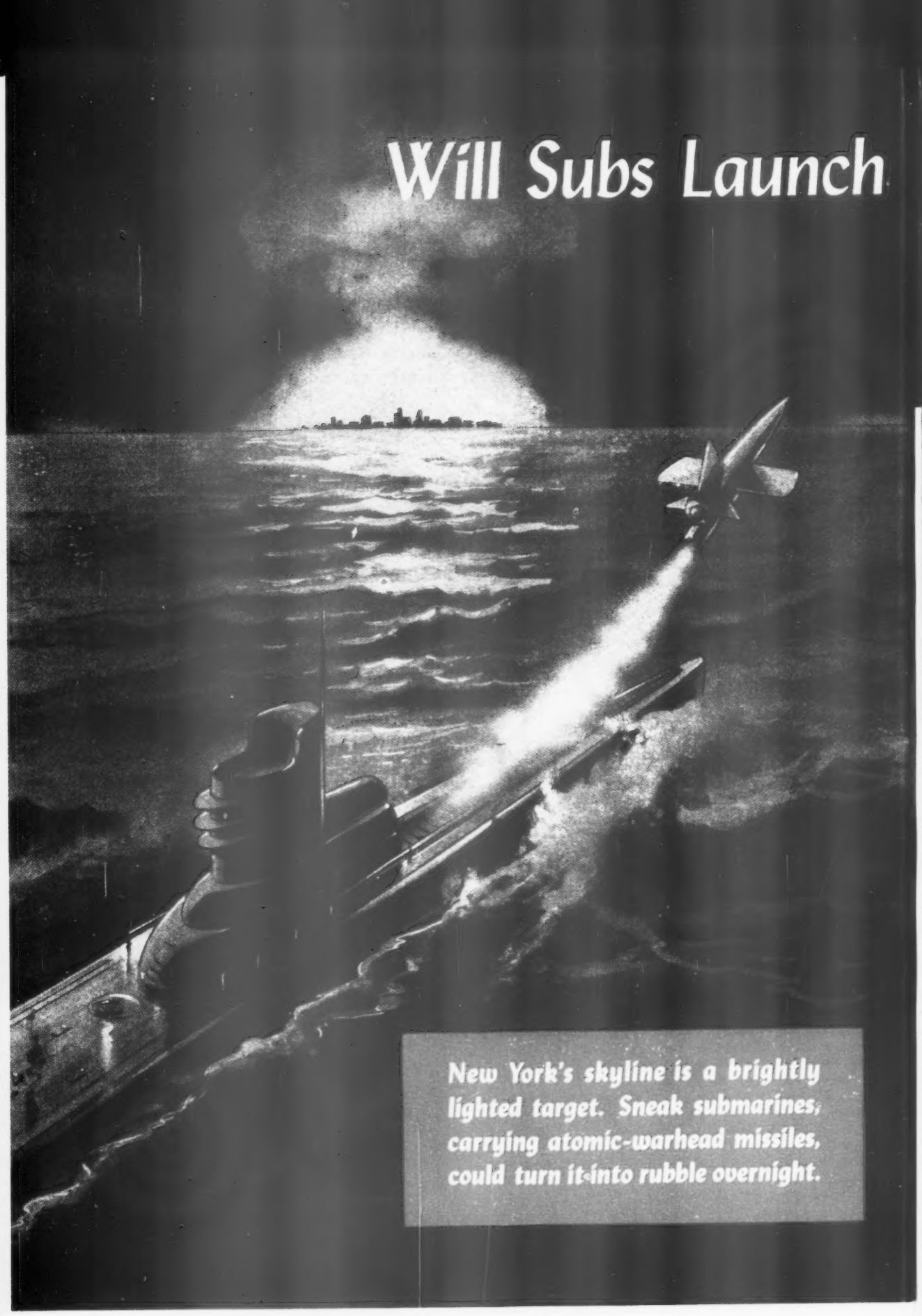
When you have qualified for training your name is placed on an eligibility list from which final selections are made by Air Force Headquarters for cadet classes which start on March 1, July 1, and October 15 each year.

If selected, you will be sent first to either Randolph, Goodfellow, Waco or Perrin Air Force Base—all in Texas—for from 31 to 37 weeks of basic flight training. Uncle Sam will pay for the transportation from your home to Texas.

Your pay as an Aviation Cadet is $75 a month. That's practically all "money in the bank," as your uniforms, flying, clothes and equipment, housing, medical and dental care are provided without charge. (*Continued on page 75*)

for more. Here's the late word on requirements.

Will Subs Launch



New York's skyline is a brightly lighted target. Sneak submarines, carrying atomic-warhead missiles, could turn it into rubble overnight.

h

the Atom Air War?

By J. WILLIAM WELSH

THE SIGNS of Times Square are still blazing. In isolated office buildings banks of lights switch on for a time and then off to mark the progress of the scrubwomen. New York City is slowly going to sleep.

Thirty miles out in the Atlantic a slim black bulk lifts itself above the waves. Submarine. A hatch breaks open. A sleek cigar-shaped projectile is trundled out on a low cart and hoisted onto a deck catapult. Once in place it is carefully adjusted. The sub lies low and steady in the water, her decks nearly awash. There is a calm order. The men drop back. A blinding flash of flame and the cigar is no longer on the catapult. An orange wake shows it to be streaking toward the lights of New York City. A second projectile and a third are hauled out on the deck and fired.

In Brooklyn, John F. Winston, a 32-year-old bookkeeper and ex-GI, kisses his wife and says, "We better go to bed, honey. I've got a tough day tomorrow." He bolts the door of the 2½-room third-floor flat and turns out the light. But this is one night in which it doesn't matter how late he stays up. For at 1:17 a.m., John F. Winston, his wife, and their apartment are atomized with hundreds of thousands of other U. S. citizens and their homes.

All along the coast the same pattern has been repeated. Within a few minutes of each other, similar attacks have been launched against every major seaboard city. Nearly all have been successful. The nation has been dealt a crippling blow. The major portion of its aircraft industry has been destroyed. It will be months before even major communications can be restored.

Fantastic? No. Such an attack is not only a future possibility but could, if other nations also had atom bombs, happen tomorrow.

It would be accomplished by the mating of the two most modern weapons of warfare—the submarine and the airplane or its robot counterpart, the guided missile.

Submarines provide the secrecy. Planes and guided missiles provide the means to deliver bombs upon their targets with speed and accuracy. Our own Navy is already experimenting with such methods. It has designated one of its underwater vessels, the USS *Cusk*, as a "guided-missile submarine" and assigned it to fire captured German V-1 type missiles in maneuvers off the California coast. Officials say that the tests thus far have been "highly effective and better than expected."

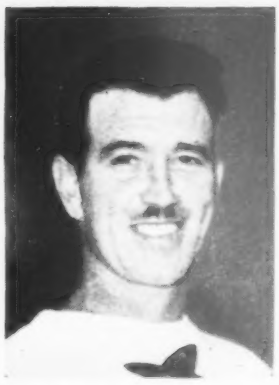
The outcome of these experiments could well be a concept of warfare that would rule out the offensive concepts of large air bases, surface aircraft carriers and piloted planes.

Two years ago, Vice Adm. A. W. Radford, then Deputy Chief of Naval Operations for Air, said: "Who knows but that the strides we have made in antiaircraft (*Continued on page* 50)

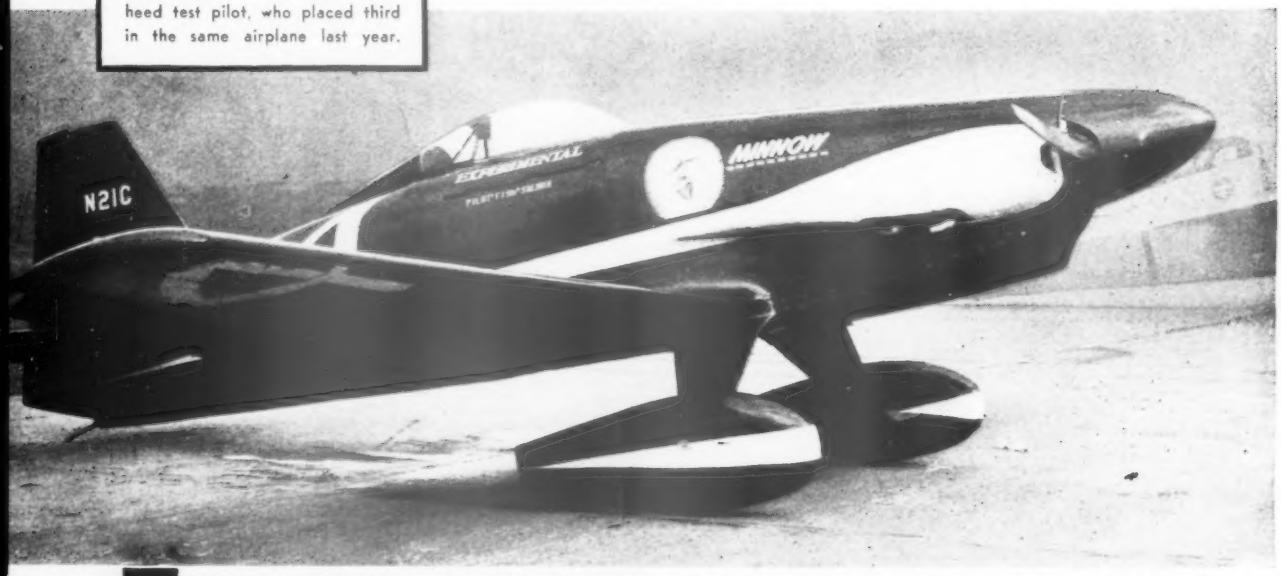
Planes launched from subs are old stuff. This captured Japanese I-14 carried two planes in a deck hangar and launched them on the long catapult leading forward.

Newly streamlined U.S. sub, the Pomodon, typifies craft which could launch an air war from undersea.

MIGHTY MIDGETS



Winner of Goodyear Trophy Race was Herman ("Fish") Salmon, Lockheed test pilot, who placed third in the same airplane last year.



1 **Minnow,** Salmon's winning plane, is one of three "Cosmic Wind" models built by Tony LeVier and Associates. Cowlings, fillets and fair'ngs were modified on last year's third place winner, improving final race speed from 159.109 m.p.h. to 169.600 m.p.h.

2 **Steve Wittman,** veteran race pilot of Oshkosh, Wis., and his Wittman Special took second place with speed of 168.862 m.p.h. Wittman finished 2.25 seconds behind Salmon. This plane had been flying only two weeks before it competed in the race.

Goodyear Trophy Race demonstrates high speed possibilities of 85-h.p. engines in miniature racing planes.

By CURTIS FULLER

Managing Editor of FLYING

AS THE STARTING bomb exploded, the nine tiny midget planes came to life. They scampered across the Cleveland airport like scared bugs, were airborne, turned the first two pylons, and came snarling down the course in front of the grandstand. They were bunched tightly. Fifteen laps to go.

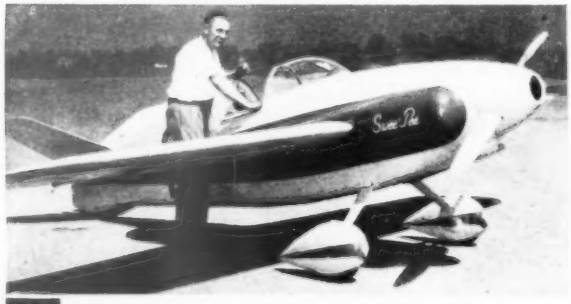
Metallic-bronze No. 4 was in the lead—*Minnow*, piloted by Herman ("Fish") Salmon, Lockheed test pilot. As fastest man in the elimination heat he had the pole position at take-off and was holding his advantage. Steve Wittman's *Buster*, flown by Bill Brennand of Oshkosh, was a close second. *Buster* and Bill were last year's winners. Third came green No. 5, *Ballerina* flown by R. B. Downey. He was followed by yellow No. 1, owned and flown by Veteran Steve Wittman.

They went by fast. At close to 200 m.p.h. it doesn't take much time for an airplane to fly 4,400 feet. That's as long as the rectangular Goodyear Race Course is at the National Air Races—4,400 feet long and 800 feet wide—exactly two miles for the circuit. The pilots fly 4,400 on one side, turn a pylon, fly 880 feet, then are on the 4,400-foot backstretch. There isn't much time for plotting strategy or even for normal breathing—for spectators or pilots.

The pilots were careful rounding the first pylons. They hadn't strung out very much and hadn't fixed the positions of rival planes in their minds. The tiny racers don't have much visibility and the air was rough. In such a race there is always the danger of ramming another plane in the blind hurry of rounding a pylon at top speed. The only position in which the pilots can really see well is when they're low and the other planes are above them. But everybody can't fly low, and the pilots had been warned against it at their pre-race meeting.

In these short, fast-turning races, the start is always most critical. The pilots have to be careful but if they are too careful they may have lost the race in the first couple of laps before it gets settled down.

Fish Salmon remained in the lead at the end of the first lap and Bill Brennand was still second. But Wittman was coming up fast.



3 **Art Chester's Swee' Pea** had fastest qualifying time but wound up third, a scant two seconds behind Wittman.

4 **Bill Brennand** in Wittman's Buster won last year's trophy but took fourth this year, though he flew a faster race.

GOODYEAR TROPHY RACE FINALS

Final Position	Name	Pilot and Home	Time	Speed (m.p.h.)	Span (feet)	Construction Details
1	Minnow	Herman Salmon, Van Nuys, Calif.	8:29.41	169.608	19' 0"	All-metal, low-wing. Cowling, fillets, canopy, gear fairing and pants modified from 1947 third-place winner.
2	Wittman Special	Steve Wittman Oshkosh, Wis.	8:31.66	168.862	15' 4"	Mid-wing, steel tubing, wood and fabric. Wittman spring-steel landing gear.
3	Swee' Pea	Art Chester, Los Angeles, Calif.	8:33.67	168.201	17' 8"	Mid-wing, steel tube fuselage, fabric-covered, wood wing, plywood-covered "V" tail.
4	Busrer	William Brennand, Oshkosh, Wis.	8:37.17	167.063	15' 0"	Mid-wing rebuilt prewar racer. Steel tubing, wood wing, fabric cover. Won inaugural Goodyear Trophy Race.
5	Little Toni	Billie Robinson, Pacoima, Calif.	8:43.30	165.106	19' 0"	Low-wing, all-metal. Sister ship to Salmon and Downey entries.
6	Pitts Pellet	Phil Quigley, Gainesville, Fla.	8:43.98	164.892	17' 7"	Low-wing, wood, steel and fabric.
7	Ballerina	Bob Downey Whittier, Calif.	8:55.14	161.453	19' 6"	All-metal, modified version of Cosmic Winds.
8	Falcon Special	W. L. Lefevers, Jr., Reidsville, N. C.	9:11.70	156.584	17' 2"	Full cantilever, mid-wing, steel tube fuselage, fabric-covered, plywood wings.

David Long, Lock Haven, Pa., did not finish. His time for the first elimination heat was 155.022 m.p.h.

He passed Downey to take third and prepared to challenge Brennand. Billie Robinson of Pacoima, Calif., flying No. 3, the third *Cosmic Wind*, was fifth. By the end of the second lap Downey dropped to fifth. Robinson was fourth.

The three *Cosmic Winds* flown by Salmon, Downey and Robinson, are sister ships. They are low-wing all-metal craft, two of them with 19-foot wingspan and Downey's version with 19 ft. 6 in. They vary in detail and coloring, however. Salmon's is 20 feet long, Downey's 16 ft. 6 in., and Robinson's 16 feet. The first two are modified versions of planes that placed third and fourth in the 1947 Goodyear Trophy Race.

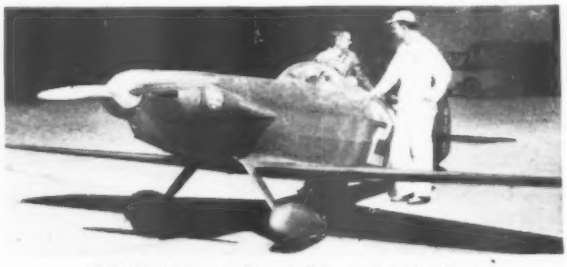
The planes roared past, ending their third lap. The first four were unchanged but a newcomer was edging up. He was Art Chester, flying *Swee' Pea*, a cream-and-green job which set the highest qualifying mark. Chester's first *Swee' Pea* placed second last year and this was a new version of the plane.

The pace got a little hotter in the fourth lap. Wittman came up on Brennand and took second place away from him. The order was now Salmon, Wittman, Brennand, Chester and Robinson. It was the same way in the fifth lap. But Chester was closing. In the sixth lap he inched past Brennand and took over third position. The order of the race was now pretty well established. The planes had settled down. They didn't interfere with each other so much on the pylon turns and were strung out so that the pilots could see the pattern with their eyes or their minds.

The main question now was whether Chester could catch Wittman or Wittman could catch Salmon. For a time it looked as though Chester might do it. But then he dropped back a bit. The race was 15 laps. On the 13th, Wittman was gaining noticeably on Salmon. Could the old master in his fabric plane, which had been flying only two weeks, catch the re-worked sleek all-metal job of young Fish Salmon which had the spare-time engineering of Lockheed specialists?

It looked like he might. Salmon (*Continued on page* 71)

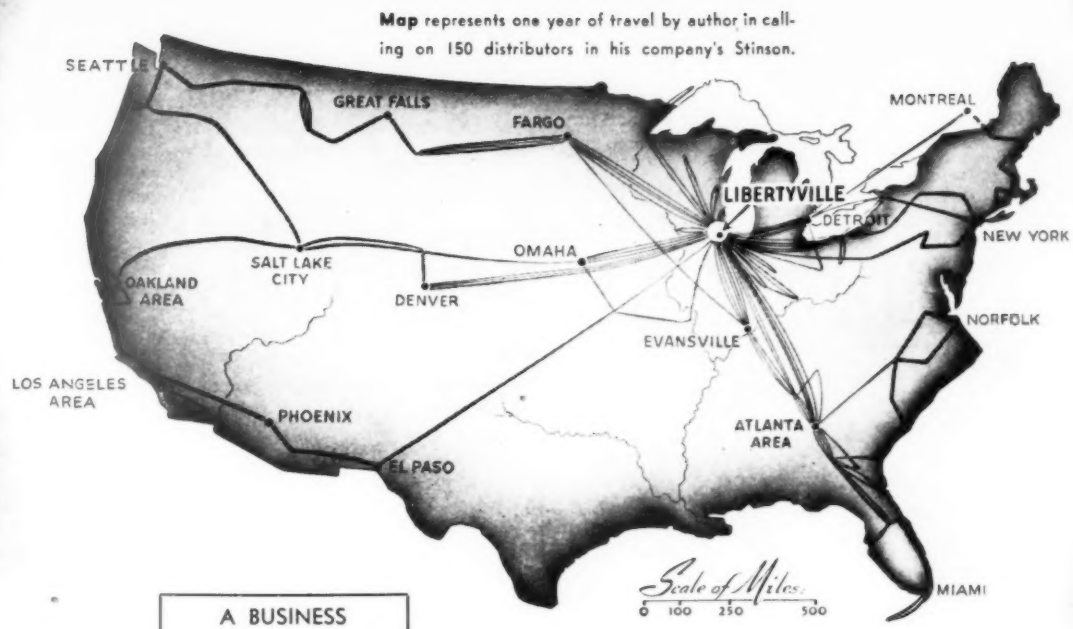
Little Toni, another Cosmic Wind, placed fifth.



Phil Quigley, in Pitts Pellet, took sixth place.

Seventh place Ballerina was third Cosmic Wind.

W. L. Lefevers placed eighth in Falcon Special.



Map represents one year of travel by author in calling on 150 distributors in his company's Stinson.

A BUSINESS PILOT'S REPORT

The U.S. is My Territory

Does a company airplane pay? The author says it is the only way he could have done the job of flying more than 60,000 miles in 18 months and calling on 150 distributors.

By CLARENCE E. KILLEBREW

Sales Manager, The Frank G. Hough Co.

BUSINESS transportation—safe, sure, fast—at 8.4 cents per plane mile or 2.1 cents per passenger mile. That's what my company's Stinson *Voyager 150* has meant to me.

After a preliminary trial period of renting airplanes, my company bought a new Stinson *Voyager 150* on March 1, 1947. In the 18 months since that time I have flown it nearly 600 hours and more than 61,000 miles. I have covered every one of our 150 distributors across the country at least once and most of them several times.

I have never had any trouble of any kind and have never had a forced landing. I have saved untold hundreds of hours of my own and my company's time.

And more important than any of these advantages, the plane has enabled me to do a job that would have been absolutely impossible without it. I'm sold on personal airplanes for business travel.

Although I have been flying since 1934 and have accumulated 1,300 hours, I have only a private license and find that I don't need any higher rating. My block-to-block speed is almost always faster than airline transportation and furthermore I land where I want to and when I want to. I'm not limited by airline timetables and my plane gets me places that an airliner couldn't.

It may seem unlikely, but this is the way I visualized the airplane when I first started taking lessons. It was back in the depression year of 1934 when I was a student at Alabama Poly (Auburn). I believed then that an air-

18 Months of Business Flying

Miles flown	61,538	Cost	
Hours flown	567.9	Depreciation	$1,448.10
Average speed (m.p.h.)	108.3	Gasoline	1,658.01
Gasoline consumed (gal.)	5,282.0	Oil	64.65
Gal. gasoline per hour	9.3	Home base storage	236.64
Oil used (quarts)	176	Trip storage*	161.06
Average cost of gasoline cents per gallon.	31.3	Maintenance, incl. spare prop	583.85
		Insurance	1,062.64
		Total	$5,214.95

Cost per plane mile 8.4 cents. Cost per passenger mile 2.1 cents.

* Includes Canadian customs and landing fees.

plane would permit me to do a better job in any business I entered when I got out of school. And it has worked out just exactly that way.

I was able to afford only about 10 hours at Auburn and I didn't take up flying again in real earnest until 1938 when I flew week-ends at Central Aeronautical in Indianapolis, now Roscoe Turner Aeronautical. I believed the airplane would be a fast, dependable means of transportation with all the independence of the automobile but with two to three times its speed. It has been just that—and more.

My employer, The Frank G. Hough Co. of Libertyville, Ill., makes roadbuilding equipment and materials handling machinery. Immediately after the war we saw that we were in for stiffer competition in our business. Our 150 distributors are scattered all over this country, Canada and Mexico. Trying to cover them by any other means of transportation than our own personal plane would have been impossible.

Our distributors are our only contact between ourselves as manufacturers, and the ultimate consumer. But these distributors also handle other kinds of roadbuilding equipment. A single distributor, for instance, besides selling our own payloaders, tractor shovels, universal road sweepers and front-end tractor-mounted snow sweepers, might be selling tractors, graders, power shovels, bulldozers, and scores of other items made by other manufacturers. Since our own equipment is but a portion of their total line, we have to see that they are putting the proper emphasis on our products. We have to help them determine the kinds of jobs our equipment can do best. Sometimes we run across entirely new uses for our equipment that we never dreamed of when we designed it. And so the job of our sales staff is to conduct a continuing personal educational campaign among our distributors to keep them informed of all up to date developments. We also help them sell, of course, but our main job is to keep them informed.

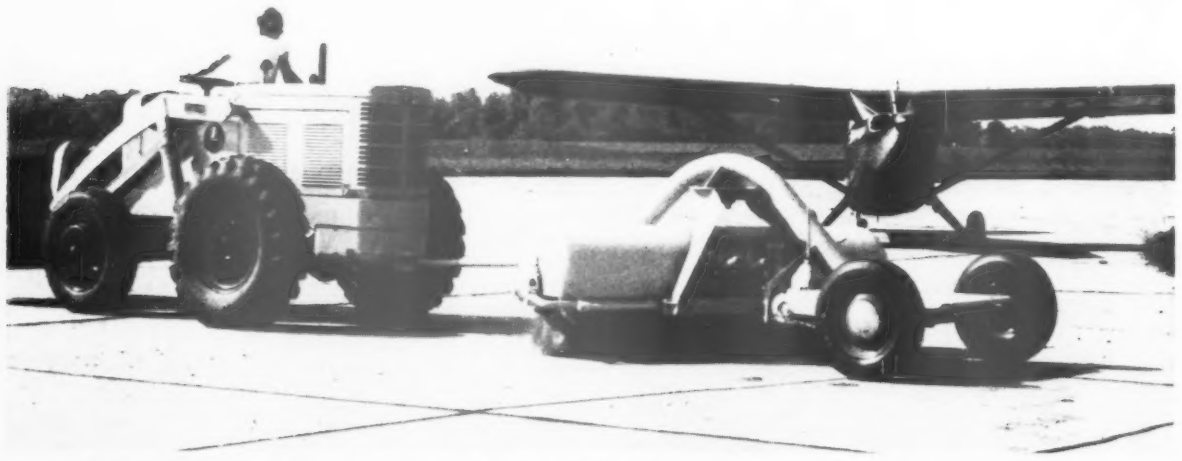
The best way to do this is by personal contact, and in this our airplane has proved ideal. The accompanying map shows the unduplicated routes I flew in the year ended February 29, 1948. It shows that I flew to the west coast twice, each time going and returning by different routes. It shows how I blanketed the middle west and covered the east coast and southeast as well.

During the first year of plane ownership I flew 381.3 hours and 41,208 air miles. My average speed was 108 m.p.h. and our total cost including maintenance, storage, depreciation, insurance, and everything else was $3,493.89. This figures to 8.4 cents per plane mile and 2.1 cents per passenger mile. Sometimes I flew alone, of course, and sometimes I carried company personnel and clients with me.

The plane is hangared at Waukegan Air Service in Waukegan. They keep the plane in excellent condition at all times as they have complete service facilities and are Stinson dealers.

We carry complete insurance which is included in the above overall cost. One policy covers the aircraft and the other covers public liability, $500,000; property damage, $500,000; and personal injury, $25,000 for each person excluding myself as pilot. For my own protection I carry an aviation clause in all of my life insurance policies.

One of the greatest benefits is that air travel is clean and not nearly as tiring as driving a car. I arrive at my destination fresh and ready to go to work. In the summer I ride in air conditioned comfort rather than pound along the highway in 100° temperatures and heavy vacation traffic. In the winter I have adequate cabin heat for comfort. My flight reports show records of outside temperatures as low as 30° below zero. (*Continued on page* 66)



Flying to inspect road equipment manufactured by his company, Killebrew finds some of it in use maintaining an airport. His Stinson is in the background. In foreground are a Hough Payloader towing a Hough Road Broom on runway maintenance.

Novice pilot finds that navigation can be made extremely simple.

First Cross-Country

New pilot Audrey Ludlow, 26, is an ex-WAVE who soloed after 12 hr. 30 min. She made her first cross-country after 21 hours, and today holds a private license. No newcomer to aviation, she and her husband operate the White Star Air Terminal at the Teterboro Airport.

By PETER BERLINRUT
Ground School Supervisor, Rausch Flying Service

IT WAS a big day when Audrey Ludlow was ready for her first cross-country solo. The pretty former WAVE left her Hasbrouck Heights, N. J., home early in the morning and headed for Rausch Flying Service in nearby Teterboro, where she was taking flight lessons. She'd just finished ground school and was ready for her first practical navigation test.

Audrey had learned to fly by conventional methods. Her instructor avoided the so-called "simplifications" or "short-cuts" either because he considered them unreliable or more complicated than conventional procedures. In consequence, Audrey prepared for her actual cross-country exactly as she had planned scores of imaginary hops in ground school.

Her route was from Teterboro to Atlantic City. She had pasted together portions of the New York and Washington sectionals which covered the Teterboro-Atlantic City route and adjacent terrain. On the map she had drawn a course line between Teterboro and Atlantic City. Now, under the instructor's eye, she lightly drew a true north line through Teterboro. She did it by paralleling the nearest line of longitude with her plotter. To measure the course in degrees, Audrey let the straight edge of the plotter rest on the course line and read the inner scale of the protractor where it fell on the north line.

"One hundred ninety-two degrees," she announced.

The instructor knew she was right. He had plotted the course frequently with other students.

"Now I've got to find my true heading and ground speed," said Audrey.

This, of course, required a knowledge of wind direction and velocity. Phoning the Teterboro tower, she learned the wind was from 150° at 18 m.p.h. She knew the Cessna would cruise at an air speed of 100 m.p.h. And she had learned how to put these facts together in a diagram to get the information she would need. Eventually, when every airport in the country has its VHF omni-directional range and every airplane its built-in wind correction, such a diagram may be unnecessary. But until then, the instructor told Audrey, this (*Continued on page* 54)

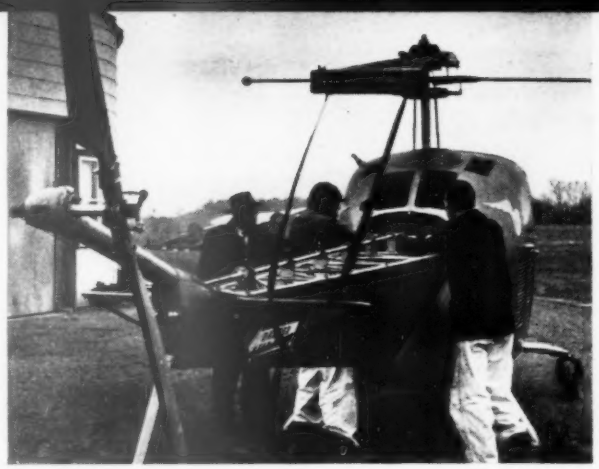
Pre-flight routine is easy if student understands basic principles of navigation. Here, Audrey and Instructor Peter Berlinrut (left) compute ground speed. Before she takes off, Audrey checks plane carefully (above). Berlinrut was a glider pilot and ground instructor in the Air Forces during the past war.

Quakertown Airport is owned by over 200 townspeople. It has eight T-hangars, repair shop and office units and a Quonset hangar. Photo from 500 feet shows B-24 (at lower left) used as air marker.

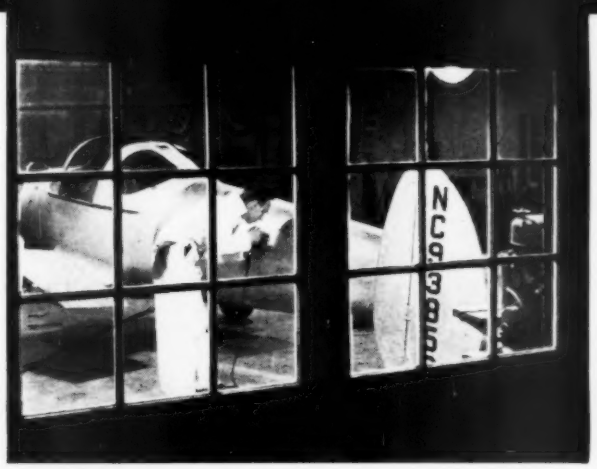
Board of Directors outlines project to bury power and telephone lines on airport boundary. From left, Homer James, Roger Taylor, Dr. Willard Tice, George Setman (airport manager), Shaeffer Hillegass.

CO-OP AIRPORT

Efficient service is the rule at Quakertown. A visiting Ercoupe gets deluxe treatment from Roger Taylor and Barbara Setman. Rear: office, lounge.



Even helicopters drop into the field occasionally. This one, owned by Metropolitan Aviation Corporation, drew a crowd of curious enthusiasts after it aided a Quakertown merchant's advertising drive.



Night shift is a self-imposed duty for Shaeffer Hillegass, a licensed A&E. He frequently returns to the field after regular working hours to wind up special jobs. Hillegass is one of five ex-GIs who started port.

Everywhere you turn in this small Pennsylvania town, you run into an airport 'owner.'

Photographs and Story By WALTER STEINHARD

THE LINE BOY at the small Pennsylvania airport was doing a professional job. He gave the *Cub's* windshield a final few swipes with the polishing cloth and stood chatting with the pilot.

"You've got darned good service here," I said to the airport manager. "But, to be honest, your line boy looks like a prosperous lawyer—or a doctor. How'd you get him?"

George Setman, manager of the Quakertown Airport, laughed. "Him?" he said, nodding toward the line boy. "Why, that's Doc Tice. He's part-owner of the field. Treasurer of the corporation. Everybody pitches in around here."

By that time, the doctor had given the *Cub's* prop a twist and was watching it taxi over to the strip. He joined us.

"Doc," said Setman, "how about telling this gentleman the story of the Quakertown Aeronautics Corporation?"

The three of us walked into the airport office, where Dr. Willard Tice and Setman unfolded the story of a remarkable airport that has turned into the pet of business and professional leaders in a Pennsylvania town of 6,000.

Little more than two years old, the Quakertown field today has the active financial backing of more than 200 of the town's citizens. It was started by five ex-GIs with an idea. Roger Taylor and Gerald Clymer, two of them, flew with the AAF during the war. Dr. Tice was a Naval flight surgeon. Setman was a CWS intelligence officer. And the fifth was Shaeffer Hillegass, an A&E mechanic fresh home from servicing Air Forces planes in England.

The five men wanted to start a successful fixed-base operation. But they had some strong convictions about the *kind* of operation it should be:

1. They didn't want to invest all their cash in runway space.

2. The airport shouldn't be a municipal field, owned by the city. George Setman said: "Airports should be run by men interested in aviation, not by people interested in political plans."

3. On the other hand, the town fathers (said the five ex-GIs) should join with everyone else in town to have an *active, beneficial* and, if possible, *profitable* interest in the field.

4. Just in case aviation wouldn't bring enough activity to the airport to make money for several years, other by-product ideas should be developed at the field.

In sum, they decided to enlist the entire town in the effort to make Quakertown Airport a booming operation.

Setman & Company organized the Quakertown Aeronautics Corporation on February 4, 1945. Setman was elected president, Dr. Tice, treasurer. From the beginning they emphasized the community angle.

The corporation bought a good site, near town but inexpensive. For some time the town fathers had been talking about building an airport—and the new corporation wanted the full support of the town council. So the corporation turned right around and deeded a tract of land to Quakertown Borough for $1 in exchange for a long-term lease to run the field.

They didn't overlook a thing. Ray Wagner (succeeded this year by Henry Hoffman) was chairman of the borough airport committee on the town council. So he was elected to the corporation's board of directors in order that the council would know (*Continued on page 53*)

Getting wires buried was a recent accomplishment. Here Setman and daughter Barbara watch Shaeffer Hillegass and Bob Long dig ditch.

Piper four-placer looks like Super Cruiser but is eight inches wider, has side-by-side front seats, and flaps. Cruise is 110 m.p.h., cost $3,825.

Piper Family Cruiser

New nose contains ram-air carburetor scoop (arrow). This two-position Sensenich prop isn't standard equipment.

FLYING's CHECK PILOT

EDITOR'S NOTE

This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Approved Type Certificate are flown. The author is not a professional test pilot. He evaluates each aircraft through the eyes of an average private pilot who flies an airplane either for business or sport.

By MAX KARANT

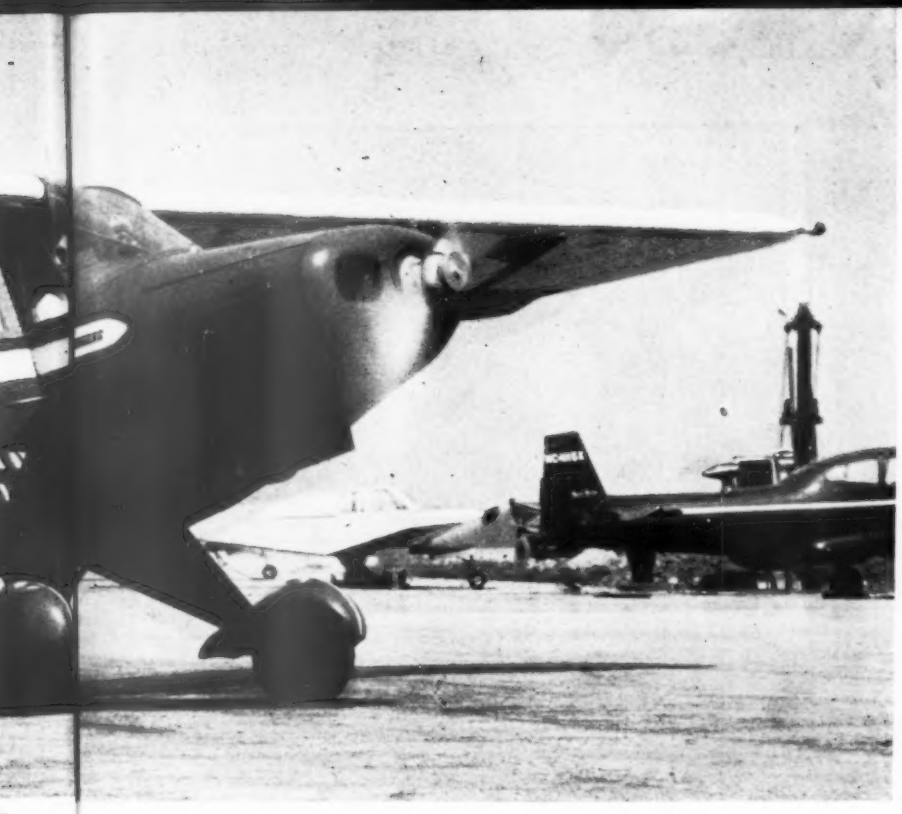
Assistant general manager and editorial director, Aircraft Owners and Pilots Association

YES, this is a "stretched" *Super Cruiser*. It is the same basic airplane, but with a number of refinements, most of them good. The front part of the fuselage has been widened about eight inches and two seats built in, side-by-side. It's the same basic Lycoming engine, with the take-off horsepower now stepped up to a maximum of 115 h.p. (at 2,800 r.p.m.).

Where the pilot of a three-place *Super Cruiser* had a better-than-average amount of room for his single front seat, the *Family Cruiser* is back in the same old cramped routine. The front seats will accommodate two people but they hadn't better be very wide. Wide people (and I am one) find themselves bumping into things as they fly this airplane.

The *Family Cruiser*, of course, is Piper's answer to the four-place competition of Stinson, Cessna, Aeronca and Luscombe. I should say that many of the other four-placers are the answer to the *Family Cruiser*. Piper's had it in the works and approved for quite some time. But the company's curtailment of much valuable sales and public relations effort has kept this airplane pretty much a mystery—a rare and unfortunate thing for a Piper product.

This airplane is a good "price" product. While it has acceptable performance for its horsepower, it is most attractive because it is a simple, safe four-place airplane that sells for $3,825 at the factory. That price, though, is "bare." Radio costs extra. So does the two-position propeller—a bit of



Interior is simple. Right front seat folds back. Radio is extra equipment.

optional equipment that should be standard. Flying the airplane alone, I got an average rate of climb of between 550 and 600 f.p.m.—which is passable, but I can't help consider that the same airplane with a fixed-pitch prop would have had poorer performance.

There's quite a bit of eye-appeal in the *Family Cruiser*. The one I flew (the same one shown in the accompanying photographs) was the standard rust and ivory. Cabin appointments were tan and grey. The wheel pants (which cost $60 extra) add to the appearance. Otherwise, except for the paint job, you'll have a hard time telling a *Family Cruiser* from a *Super Cruiser* at first glance. But when you look close you'll see the new nose with its ram-air carburetor scoop, and the flaps.

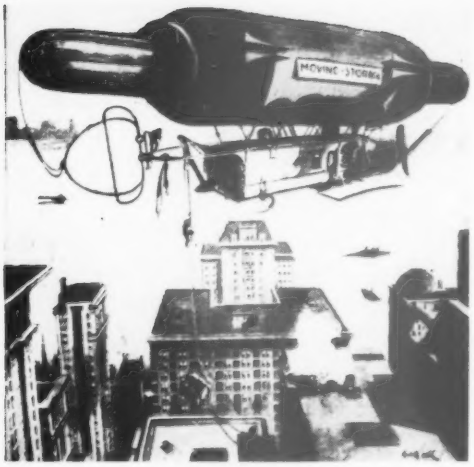
I enjoyed flying the *Family Cruiser*. It's as easy to fly as a *Cub* trainer. It's also as docile. There aren't many gadgets that will cause trouble if you forget to use them so the average guy will get along very well with it. And the flap adds so much to the ease with which you can land and take off that it's actually fun to practice landings, for example. That's unlike the *Super Cruiser*, which has no flap. With the same basic wing the *Super Cruiser* will float clear across the field unless you learn how to slow it up and land it out of its normal flat glide.

Climbing into the *Family Cruiser* is a chore, particularly in the front seats. To get into the left front seat the pilot must trip a release on the right front seat and fold it over backwards, out of the way. He then must step over the folded seat onto the floor, hang onto one of the two tubes that cross the windshield, swing his backside into place, and sit. The busiest acrobat of all is the person who sits in the right front seat—and if it's your girl friend you'd better have a heart-to-heart talk with her first. It goes something like this:

Once the pilot is in place, the person slated for the other front seat steps over the folded-back right seat. He (or she) then pulls the other foot in over the folded seat. All this time, of course, that person has hold of one or both of the tubes that cross the windshield, holding himself as far forward as possible. The already-seated pilot then reaches behind his half-standing, half-squatting passenger and (*Continued on page* 70)

Large drag flap is one of Family Cruiser's best features. It makes landings on small fields easy.

Baggage compartment is reached by unhooking rear of back seat. Maximum capacity is 80 pounds.



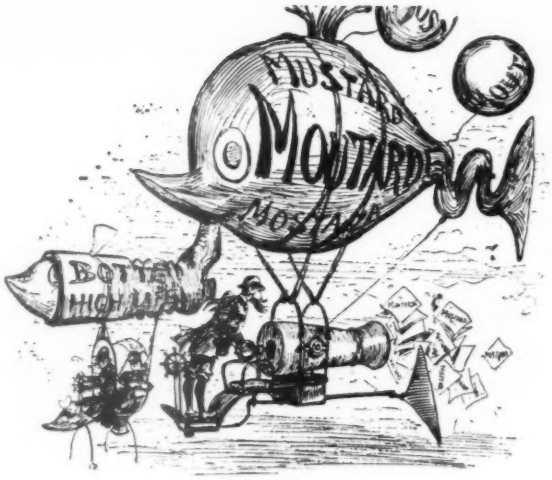
Moving day in 1950—as foreseen in 1909. This cartoon was meant to ridicule aviation prophets. But today's reality, though different, bears out the prophets.

Super-efficient air delivery was proposed by A. B. Walker in 1907. Though planes today exceed anything Walker could have dreamed of, they still can't do some of the routine work-a-day jobs that the early enthusiasts forecast.

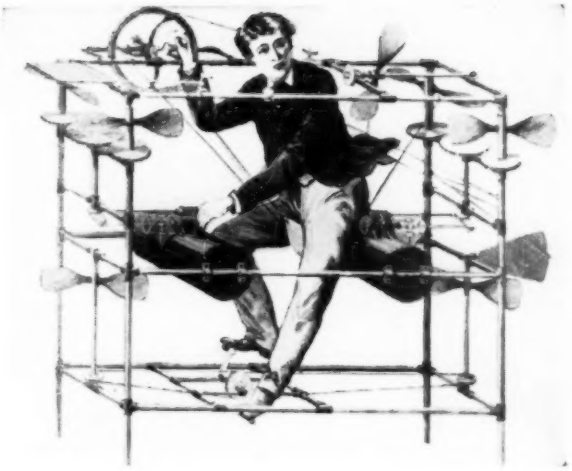
When Nothing Flew But The Birds...

LIKE the millions who laughed at "Darius Green and His Flying Machine," the cartoonists of preflight days had a wonderful time with crackpot inventors. They were convinced that airplanes able to carry human beings would never be built. Anyone who thought otherwise was a subject for the lunacy commission. Even at the time of Kitty Hawk, few believed that the Wright brothers had actually flown. Most of the cartoons reproduced here are tongue-in-cheek predictions of the future by British and French artists. A jet plane is envisioned as a cigar-shaped monstrosity piloted by an obnoxious dandy. Sky-writing is anticipated not as smoke-writing but as advertising plastered over a balloon. Airmail is seen not as fast transportation between distant cities but as personal delivery by a daring young woman whose pilot is dodging a chaotic maze of telephone poles and wires. These cartoons are by men who believed that nothing constructive could ever come out of aviation. END

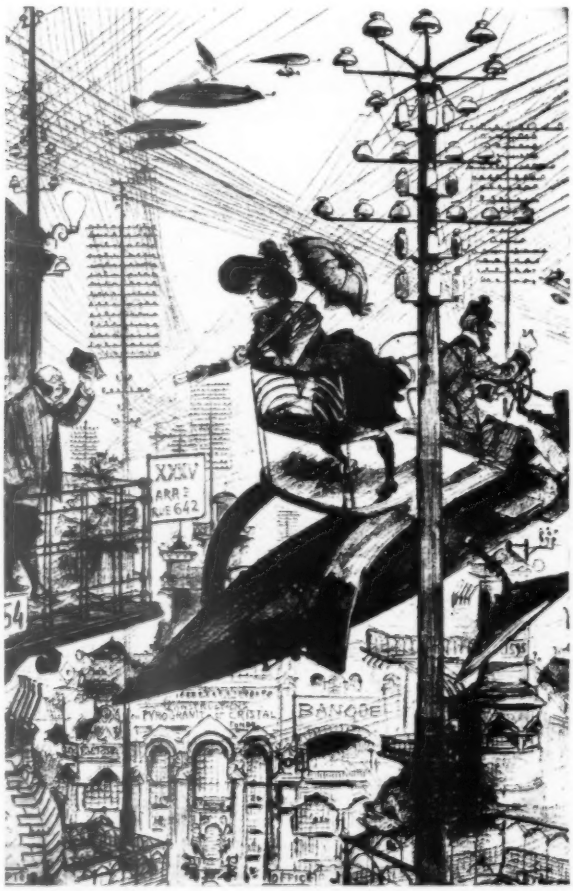
Jet propulsion, 1841 version. This cartoon was labeled, "How to travel from Paris to Moscow in an hour." Note saddle and stirrups.



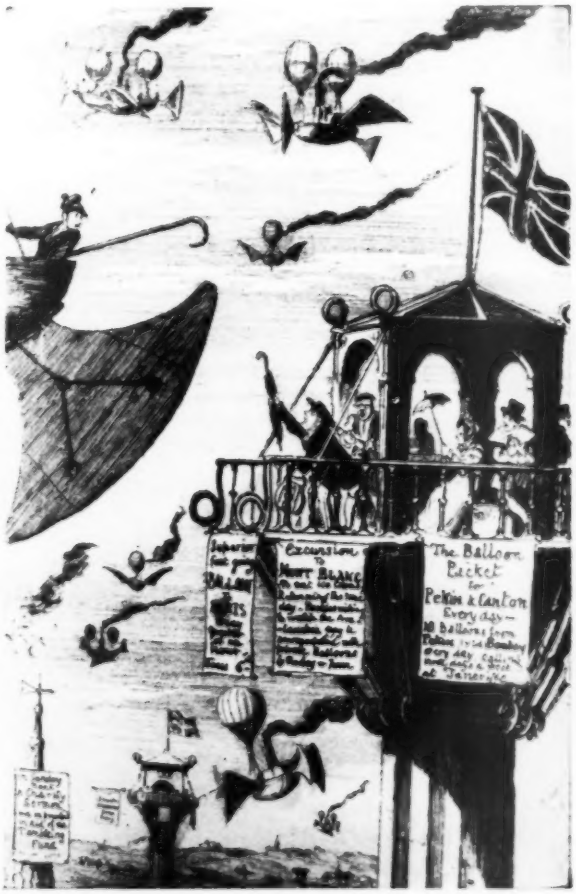
Aerial advertising was predicted in 1882 by the artist Robida. The balloon plugs mustard in three languages. The gondola holds a cannon firing out advertisements.



Helicopter, 1885. It was designed by Dr. W. O. Ayers, and had seven tiny propellers driven by compressed air contained in two drums. The craft was supposed to have long range.



Airmail, 1882. The exact motive power and means of lift in this French cartoon are a bit obscure, but the mail carrier, handing a letter to the janitor, has attractive possibilities.



Air traffic, 1845. George Cruikshank, the British caricaturist, suggests a landing pole for aircraft. Proposed "service" included daily hops to China, balloons to Paris every 15 min.

Wind tunnel tests were conducted at University of Washington by Designer Moulton Taylor (left) and Arthur Robertson.

AEROCAR

By ELLIOT MARPLE

West Coast inventor builds a flying auto which he says will revolutionize aviation industry.

THE NEWEST flying auto is Moulton B. Taylor's *Aerocar*. Quarter-scale models of the stubby little roadable turned in promising performance figures in wind tunnel tests at the University of Washington recently, and the first full-scale model is expected to fly early in 1949.

Its designers (Aerocar, Inc., Longview, Wash.) say the flying auto will sell for between $3,000 and $4,000.

Aerocar will accommodate three passengers on the highway and will carry two persons in the air. It will have two-control operation in the air—and will use a pusher propeller, located aft of the tail surfaces.

The corporation's blueprints show that as an automobile *Aerocar* will be shorter than conventional cars. Its wheelbase is 78 inches.

As an airplane, *Aerocar* will be 21 feet long and have a wingspan of 29 feet. To convert to an automobile, the wings will fold back against the tail, forming a trailer that rolls on a pair of small wheels in the leading edge of the wings. The automobile will hook onto the trailer just under the elevators and pull the wing and tail assembly backward. This keeps the widest part, the elevators, next to the car for easiest road handling and least likelihood of damage. At the elevators the trailer is eight feet wide, the maximum allowed for highway hauling.

Car and trailer will be 24 feet long. If the trailer, weighing 376 pounds, is wheeled first into the garage, the auto can back in as though coupled snugly for flight. *Aerocar* thus fits the standard 21-foot garage.

Taylor points out that most designs for flying automobiles call for a four-place plane and therefore run into major operational and structural problems. *Aerocar* limits itself to two passengers in the air for several reasons. For one thing, various passenger loadings in a four-place plane cause a marked shifting in center of gravity. This makes two-control operation practically impossible.

For another thing, a four-place plane is larger and that immediately raises new design problems in order to hold car and trailer to a size that can travel readily on the highway.

A bigger consideration is the power plant. A four-place flying automobile would weigh not less than 3,000 pounds, Taylor estimates. That would require at least a 200-h.p. engine—far too much for practical use in a light automobile.

But a two-place flying auto- (*Continued on page* 73)

Novel flying auto is three-placer on road, two-placer in air. With pusher propeller, plane will cruise over 100 m.p.h., land at 53 m.p.h., designer says. Fuel consumption is estimated at seven gallons per hour. To convert to auto, wings fold against tail, forming trailer unit.

The Narrow Escapes of Mr. Sharp

PAGE 8 ★
Cadet Falls Out of Plane, But Hitches Ride to Earth
Grabs Rudder at 500 Feet; Decides to Stick To Ship Though Offered Chance to Jump
Tuscaloosa, Ala., Jan. 15.—(UP)—The story was told today of how British Aviation Cadet Derek M. Sharp of Yorkshire, England, fell out of a training plane at 500 feet, but caught on to the ship's rudder and rode safely to earth.
The plane was flying at about 500 feet yesterday near the train school when suddenly found
havior of the ship that his passenger was missing, and saw him on the tail.
"In an attempt to attract student's attention, McCa kicked the rudder bar forth, and to his Sharp take hold

How long can luck last? The young British cadet cheated death by inches.

Cadet Sharp demonstrates how he rode tail to ground after bouncing out of cockpit.

By JAY A. McCAUSLAND

THIS IS the story of a man who bounced out of an airplane, got picked up by the slip stream, hurtled past the tail—and lived to tell about it.

By all odds, Derek M. Sharp's last day alive should have been January 14, 1942. The young cadet from Yorkshire, England, was a student of mine at the Air Forces Training Detachment at Tuscaloosa, Ala.

He had 15 hours of flight time (five hours solo) when we took off on a routine hop to practice landings that day. I wanted to log some quick dual, then send him out solo for the rest of the afternoon.

We made our first turn at 300 feet and proceeded to 500 feet on the downwind traffic leg. Sharp had the controls, and I glanced over toward the airport building to check our pattern with the wind-tee. About that time we hit some turbulent air. The plane shuddered violently, then nosed up into a rapid stall. I hardly had time to think (seems to me I remember re-evaluating Sharp's ability as a pilot) but grabbed the controls quickly, feeling an undue back pressure on the stick. I pushed both it and the stabilizer full forward and opened the throttle as far as it would go. Gradually the ship leveled off. Since other planes at that time were flying close by in traffic, I figured we must have been hit.

I looked around at Sharp and to my complete amazement found him missing. The ends of his gosport tubes dangled over the side of the cockpit. He was gone. Next I looked below for an opened 'chute. There wasn't any. My eyes searched the plane and the sky. Then I saw him. There was Sharp dangling from the tail and wriggling around frantically in an attempt to get up onto the elevator surfaces! Not only was he in extreme danger, but his struggles were endangering control of the plane. He had hold of both flying wires of the horizontal stabilizer and had one leg partially on the elevator. Every movement he made caused the ship to lurch or skid. We were in danger of falling off into a spin at any second. Our altitude was then only about 350 feet—too low for either Sharp or me to use our parachutes.

In a matter of seconds, Sharp hoisted himself onto the left stabilizer and momentarily sat there to get his bearings. Then, realizing that he was creating serious unbalance, he moved his left leg around the vertical fin and rode with his back to me, straddling the tail.

All this time I was having trouble with the rudder controls. Sharp's body blanketed the slip stream and rendered the rudder almost useless. In the gentlest climb I think I have ever made, we finally attained an altitude of 2,500 feet where (I hoped) I could test the flying characteristics of the airplane and also allow Sharp all possible room in which to jump.

I found that the ship would fly fairly well with decreased throttle, and it seemed possible that I could be reasonably safe in trying to land—if I had to— with Sharp still on the tail. In an attempt to attract Sharp's attention, I kicked the rudder pedals back and forth. To my surprise, I felt him take hold of the balance arms and wiggle the tail back at me! I sort of waited for him to give me an indication of whether he intended to jump, but instead he gave the old (*Continued on page* 62)

Busy hangar at Compton Airport houses the Self-Service Repair station. A private owner brings his PT-22 into the Stolp-Adams shop and is met by George Adams (on wing) and Lou Stolp (near plane). Because owner will do most of work, repair charges are lower.

Self-Service Repair Hangar

Pilots are their own mechanics at this unique airport operation.

LOU STOLP and George Adams were down to their last buck and their maintenance shop had only a trickle of business. Then they hit on an idea.

"Let 'em repair their own planes," suggested Lou. And thus began a unique experiment in airplane maintenance at Hangar Seven, Compton (Calif.) Airport. Owners do their own repair work under the supervision of Adams and Stolp, both licensed mechanics. The shop furnishes tools and sells parts at better discounts than most supply houses.

Pilots save money by paying only a small fee for use of tools and for supervision. Business is booming.

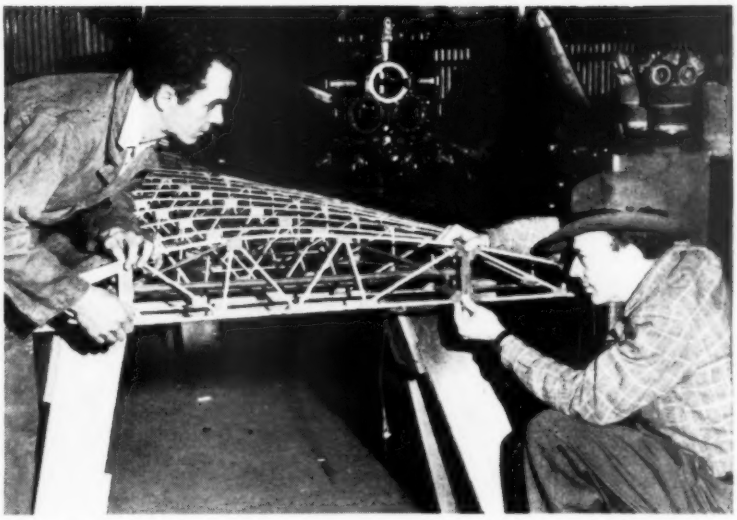
"With our service, plane owners spend most of their dough for flying, not maintenance," says Adams, a CAA-licensed inspector. "Owners get a real kick from working on their planes. Doing it under our supervision keeps it legal and saves them money." END

PHOTOGRAPHS BY ROSS-PIX

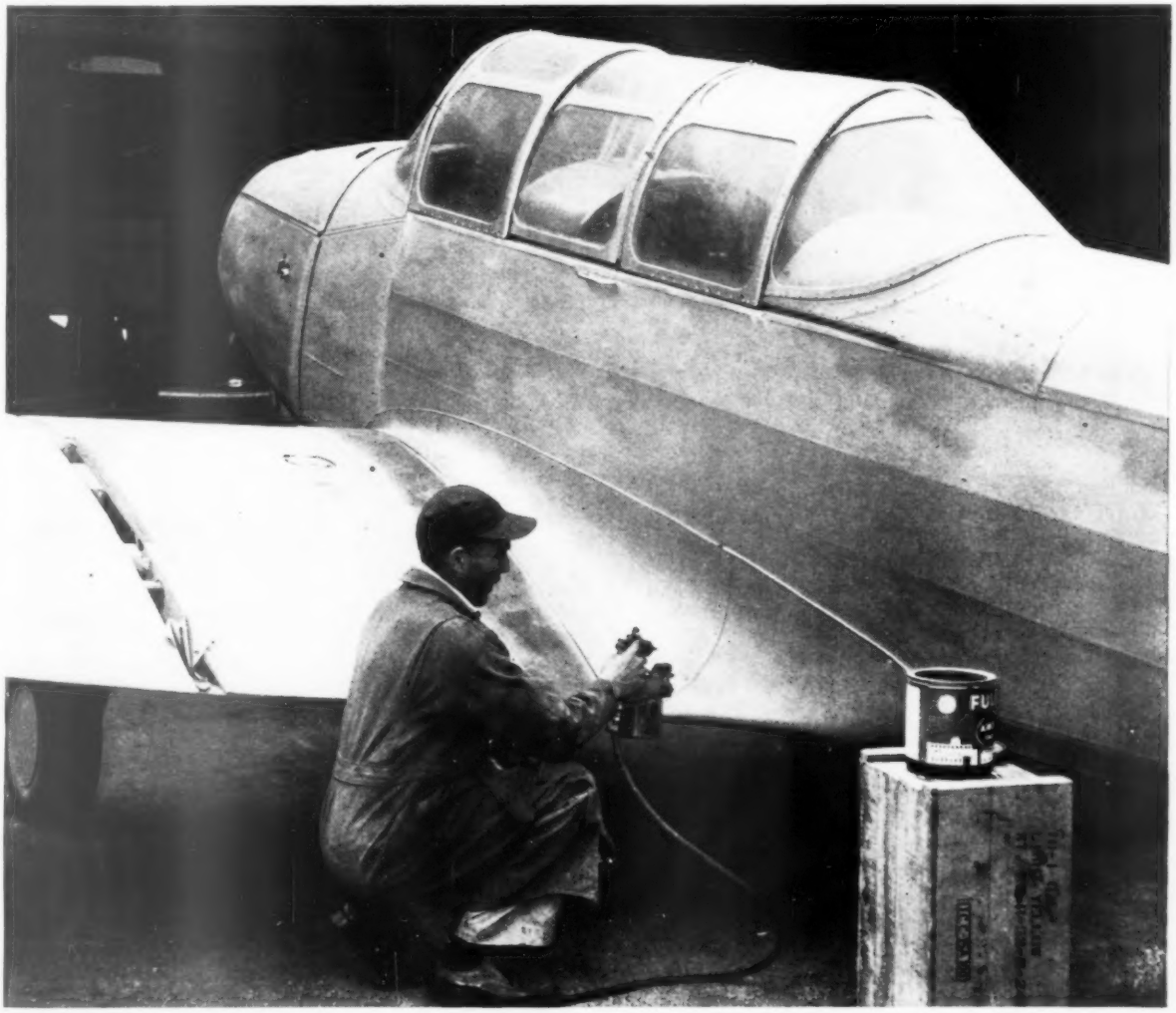
Repairing engine of Funk Bee, Herm Schwartz (right) and Floyd J. Fuller of Hollywood, Calif., are supervised by George Adams.

Bargain-hunter Earl Armitage (left) bought cracked-up Luscombe because he knew of Stolp-Adams service. Lou Stolp helps.

Soundproofing Cessna T-50, owner Robert Grafton pays $20 monthly plus cost of materials.



Installing rib spar on Funk Bee, Floyd Fuller is checked carefully by Stolp. Total cost for complete recovering and wing structure repairs will be approximately $200.



New paint job is a cinch for Bill Butcher, a Los Angeles mechanic. He flew into Compton Airport with the Fairchild PT-26's owner, Bill Brownfield. After selecting paint and purchasing it from the Stolp-Adams parts and equipment shop, Butcher uses their spray gun.

Happy hunter bagged buck in North woods region. Wisconsin's season lasts nine days.

For flying sportsmen, Wisconsin should pay dividends in venison.

Deer Hunting in Marinette County

IN THE CITY of Marinette, Wis., deer hunters are happy. The season's in the offing. And deer are so plentiful townspeople have seen them right on the edge of town.

Up at Northland Flying Service, just across the Marinette County line in Quinnesec., Mich., Operator Walter J. Bourdlaies says optimistically:

"Students here have seen as many as a dozen deer in a 40- or 50-minute flight. Why, deer and an occasional bear can even be seen crossing the runways right here at the airport!"

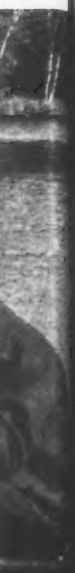
The 1948 season for forked-horn bucks will be nine days (November 20 through November 28) and Marinette County, with its heavily-wooded and lake-dotted terrain, ranks as one of the best deer-hunting areas in Wisconsin. Other top counties for deer include Juneau, Adams, Jackson and southwestern Wood—and particularly, Bayfield and Vilas counties.

Pilot-hunters have adequate time to arrange for accommodations at resorts near any of six or seven airports serving the area. Facilities are available for large numbers of hunters—both for the old-time "brush-pounders" who venture far into the wilds with basic equipment, and for those who want to stay at hotels and hunt in easily-accessible spots. There's a place for every taste—for the hunter who gets most of his pleasure at night in a Wisconsin tavern, swapping tales as he sits on a stool in his red togs, or for the hunter who knows his business and is on the prowl from sunrise to sunset.

Open season for deer hunting with bow and arrow in Marinette County is from September 25 to November 7, with a bag limit of one deer (any age or sex) per season. Wisconsin's first deer archery season was in 1934. Since that year, the sport has grown rapidly and most of the young bloods in Wisconsin take a crack at it each year.

Flyers heading for this deer-filled county can expect excellent cooperation from airport operators, the majority of whom have the typical Wisconsin deer-hunting fever themselves. Marinette County (which covers 909,597 acres and has over 271 lakes) is famous for its recreational facilities and the country is studded with resorts, hunting lodges and tourist camps. A quarter of a million acres are permanently set aside for recreation and reforestation projects.

A map of the county and a list (*Continued on page* 68)



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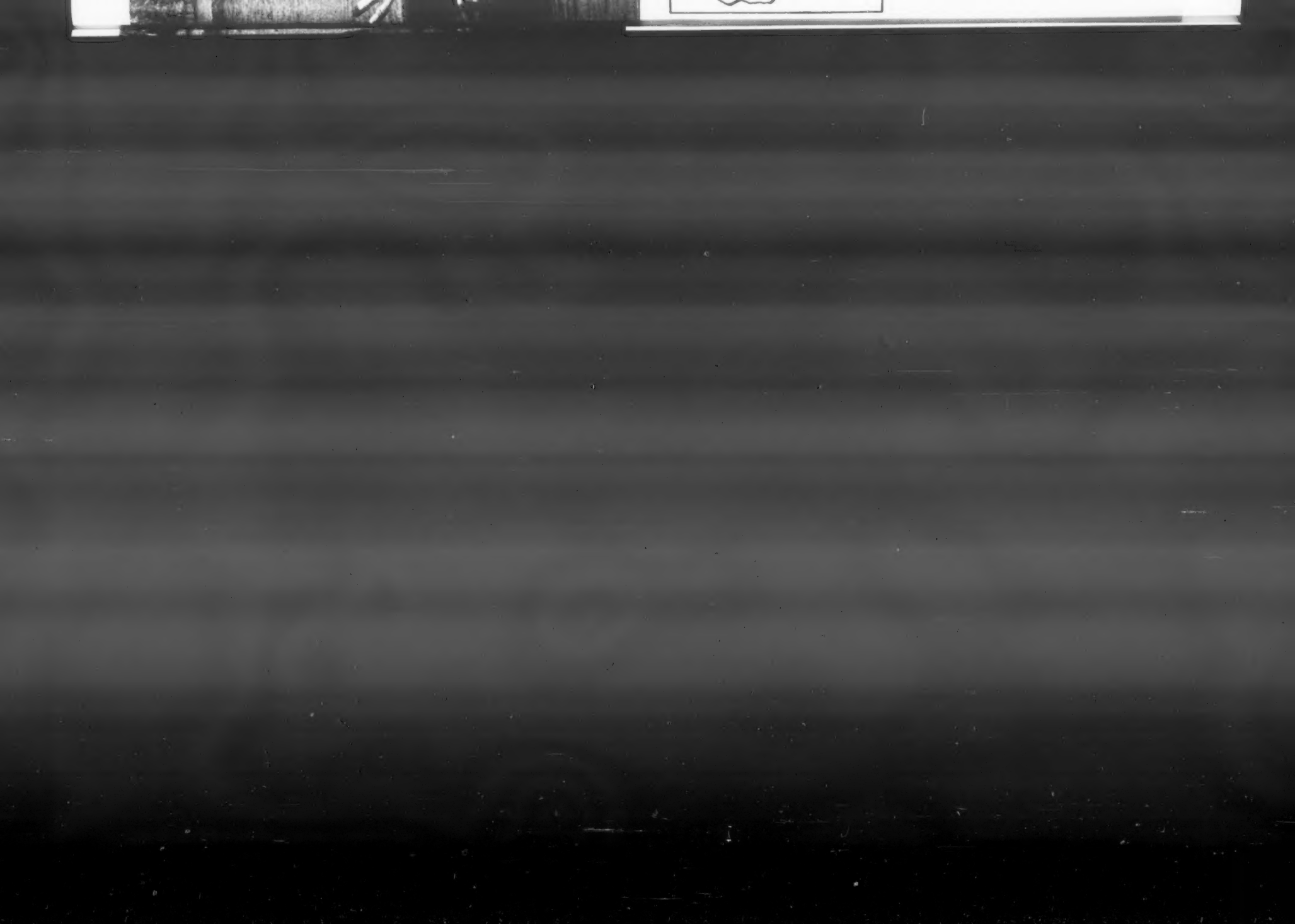


Hunting parties converge on county from all parts of U. S. Most (above) are able to bag their buck.

Using canoe for transportation, these archers (left) head home after downing young buck.

Fly straight up and straight down in a mass-produced plane? It's possible.

BILL STOUT SAYS:

Let's Consider the Flapping Wing

THE ROADABLE plane won't solve all our problems. For a private-owner airplane to be successful, the manufacturer must be able to sell it at a 1,000-per-day volume and at a price consistent with its utility.

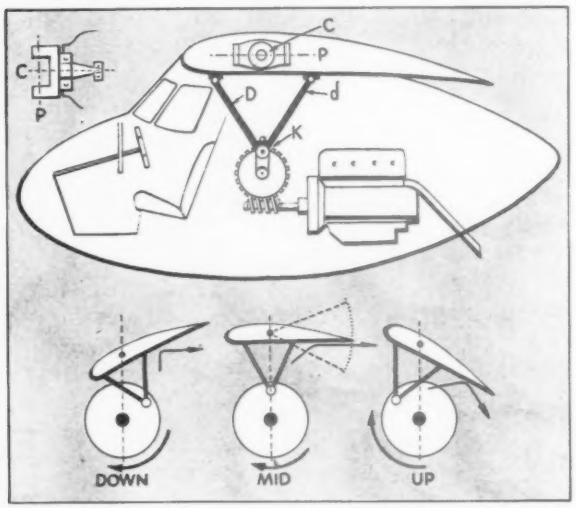
The lower the price, the greater the sales volume. But no matter how low the price, *even if you gave away today's private planes* there are not 1,000 people in the U. S. per day who could use them.

Therefore we must create a new type vehicle which combines the best features of the airplane, the motor car, the helicopter and the old rocking chair.

And the fundamental requirement for a universal vehicle is that *it must use its full power as an assist in landing.*

It must be able to set itself down, using its own power for control, from a 50-foot altitude *in vertical descent* without discomfort and certainly without danger to the passengers.

Today's airplanes, standing on the ground, have no lifting capacity. Their ability to rise and to control themselves depends on forward speed. The higher speed the more control—the slower the speed, as in landing, the less control. For them to rise from the ground a 50-m.p.h. wind must be blowing past the wings, at which time lift is sufficient to permit the vehicle to take off.



Power transmission for flapping wing might be like this. Wing is hinged at root and pivoted at point C so it can turn on the pivot. Below is crank K, driven by a motor. As crank K turns, it not only flaps the wing up and down longitudinally but double connecting rod D-d changes wing's angle of attack on the up-and-down stroke (see bottom sketches). Difference in angle would compensate for lessened power lift on upstroke and increased lift on downstroke.

Flying in a 50-mile wind, it is possible for a present-day plane to stand still with relation to the ground by putting exactly enough power into the propeller to meet the 50-m.p.h. head wind. This is simulating a vertical take-off of the same airplane *if we were able to make a 50-m.p.h. wind pass by and over these wings* while it is standing still.

If we could do this our controls, ailerons, elevators and rudder would also be effective in the 50 m.p.h. wind, even though the plane were standing still.

Suppose we use our imagination. Say, for example, that on a conventional-appearing plane were hinged wings just above the cabin on either side, and that we have the engine power in the plane hooked up to *flap* these wings on either side up and down in unison, somewhat like insect wings. (See Figure 1.)

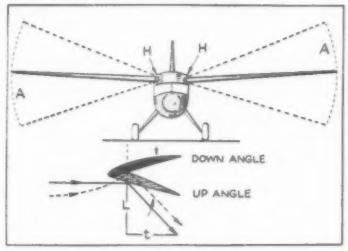


Figure 1.

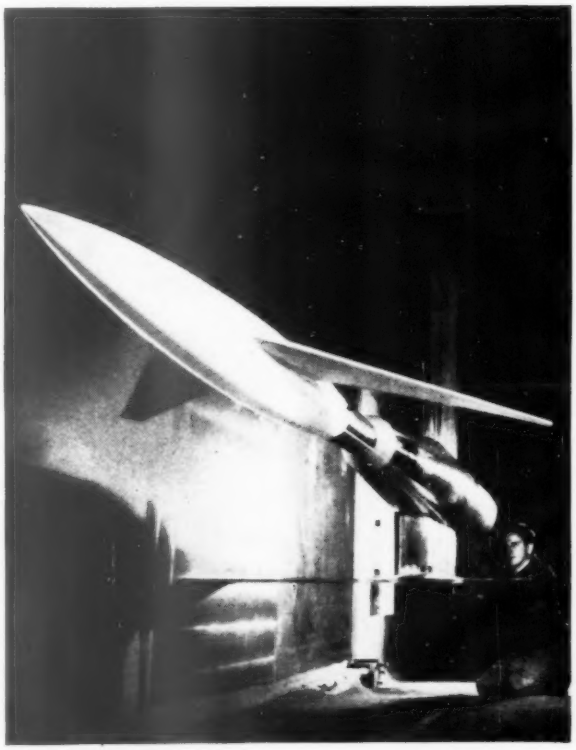
Just flapping the wings would create very little draft to the rear because the angle of attack would be the same at all points. Also, on the down-stroke there would be a great upward lift on the fuselage and on the up-stroke a down force would make it drop again. Suppose, however, that on the up-down stroke we give it a flat angle, as in the lower sketch (Figure 1) labeled "down angle." In going *down* on its down-stroke this would pick up the oncoming air, as shown by the dotted line and arrow, forcing the air from the wing *down and back* to give not only lift to the wing, as at (a), but with a thrust shown by the line (t) the other side of the triangle.

In up-stroke the attack angle would be much steeper, as shown by the "up-angle." The air meeting the wing, as in the solid lines, would also be a little straighter before it hits the wing and would then be deflected by this steeper angle along the *solid* line with arrow at the end.

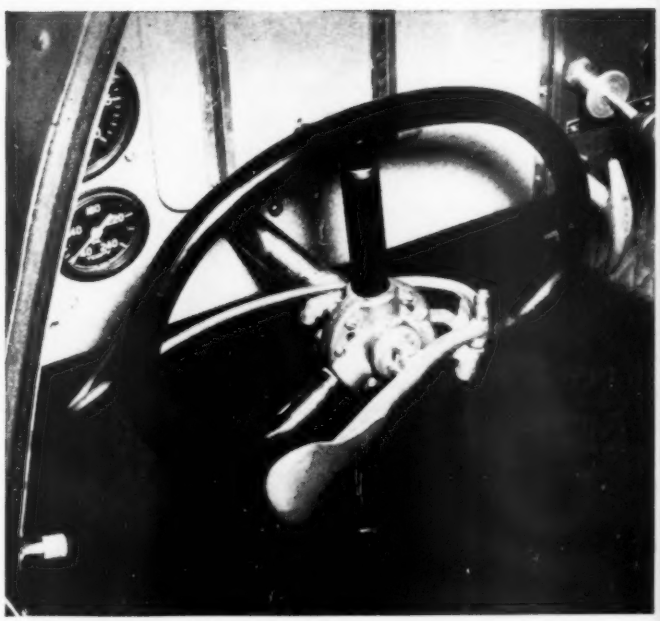
You will notice that the lift and thrust on up-stroke and down-stroke are at an equal angle and are equal so that in flight there would be a consistent thrust *on both up and down stroke,* except at the (*Continued on page* 60)

Ram jet engines were fitted to wing tips of an F-51D for test work at Wright Field. Tests showed engines are more efficient at supersonic speeds.

HAVE YOU SEEN?



Plane of tomorrow? Swept-back wing design is being readied for test in world's largest supersonic wind tunnel at Ames laboratory of NACA, Moffett Field.



Ercoupe for paraplegics was developed by Grand Central Airport Company, Glendale, Calif. Special brake permits full operation of plane with hands only.

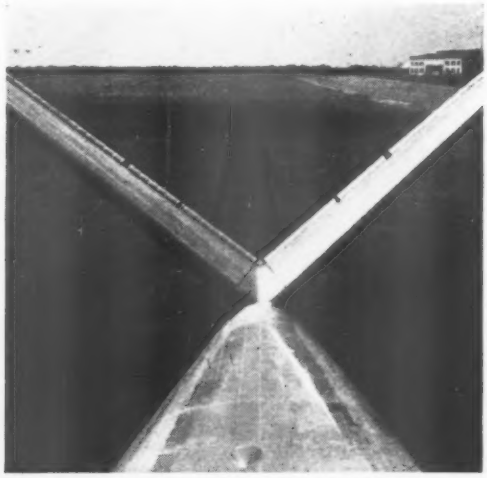
HAVE YOU SEEN? *continued*

Air-sea rescue boat, built by Edo and parachuted from Superfortress, has range of over 500 miles, weighs nearly three tons.

Tandem-wheeled Piper PA-11 was modified by Art Whitaker, Portland, Ore., operator, who expects to produce gear for sale.

Supercharged AT-6 was modified by Vest Aircraft Co., Denver, for use as cloud seeder. It climbs 2,000 f.p.m. at 6,000 feet.

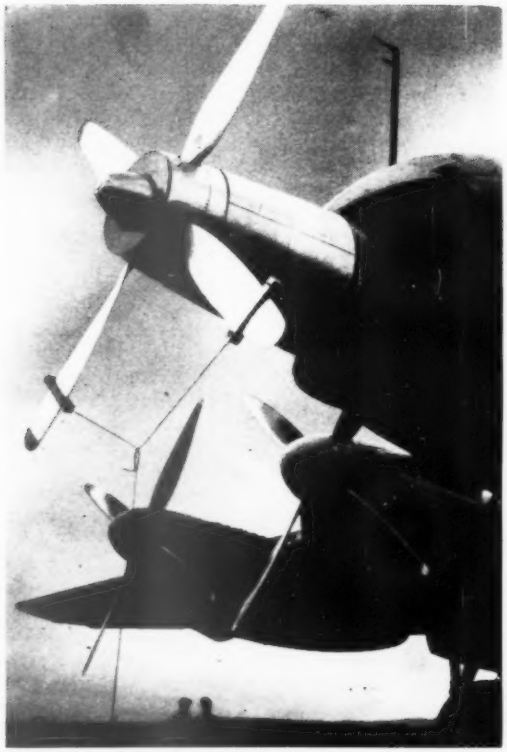
Special door on Aeronca was designed by H. F. Troxel, Portland (Me.) Flying Service, to permit pilot to swing prop from float.



Belly landing recently made by Beech Twin Quad proved soundness of integral landing keels which have been built into the plane. Rudder control was available during the 615-foot run. There was no skin buckling and bottom of plane didn't touch ground, though rain had softened it.

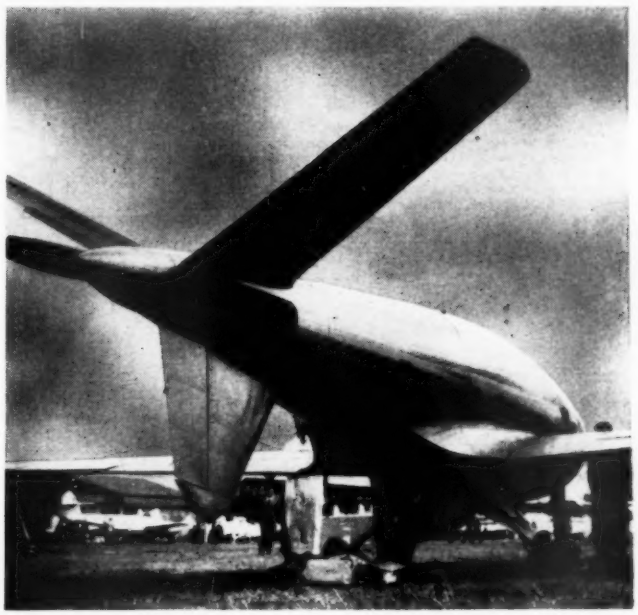
BRITISH PLANES AT FARNBOROUGH

Bristol Type 171 helicopter shown at British Aircraft Constructor's Display has unusual-designed crooked tail.



Avro Lincoln bomber is fitted experimentally with Naiad turbo-prop. British have made many turbo-prop tests.

Cierva helicopter is largest ever built. It will seat 26 persons and if successful may replace airliners on short hops within the British Isles.



Planet Satellite is unusual new executive plane. It makes extensive use of magnesium, has exceptionally clean lines, butterfly tail, pusher prop.

Hawker Jet N.7/46 is new naval fighter powered by Rolls Royce Nene turbojet. It has tricycle gear and has flown at speeds over 600 m.p.h.

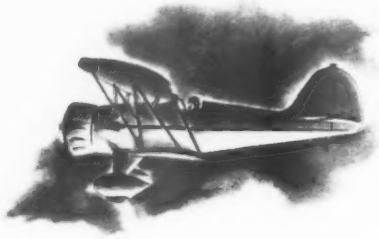
I Learned About Flying From That! NO. 108

Screen actor Brian Aherne was one of the original sponsors of AOPA and holds membership No. 9. Aherne has been flying since 1935, has owned a Waco F-3, a Fairchild 24 and is currently awaiting delivery on a Beech Bonanza. During World War II he was a civilian instructor, training British cadets in Arizona.

By

BRIAN AHERNE

Movie star in Waco was lost at night. And he didn't have a script to follow.



LOTS OF ACCIDENTS are blamed on pilot error. Here's one caused by pilot ignorance—sheer pilot ignorance that dumped me, completely lost, in a rock-studded Pennsylvania field one dark night, my prop against a hedge.

I hadn't been keeping track of the time on that flight. I was smugly holding a compass course, musing on life's foibles and nothing else. And I wasn't even able to read a string of beautiful check points that led directly to my destination, 20 miles away.

It was the kind of mess that any pilot can find himself in—if he doesn't use his head. The same kind of thing has happened to guys in B-29s and in *Bonanzas*, in *Jennies* and in *Ercoupes*. This is the way it happened to me:

Back in 1936 I'd logged about 65 hours in my Waco F-3, hopping from Los Angeles' Mines Field as far as Palm Springs and San Diego. I didn't plan to make any longer cross-countries until I'd chalked up some more experience.

Then, one afternoon, I casually mentioned to a friend that I was leaving by train for Philadelphia the next day.

"By train?" He looked surprised. "By *train?* Why, Brian, boy, why don't you *fly?* It's just the same as a hop down to Palm Springs. Only farther."

His logic seemed flawless. "After all—why not?" I asked myself. The upshot was that I got a batch of charts, laid out a compass course, and took off for Philadelphia.

The flight was simple. First night out: Winslow, Ariz. "This is great. Great." I was at peace with the world. "There's nothing like cross-country flying."

The next day, I made Woodward, Okla. The weather was fine; I was right on course. Next morning, I discovered a magneto was out—but blithely took off on the other and stopped for repairs in Wichita.

The Alleghenies didn't even occur to me until I was gassing up at Pittsburgh. In those days, some of you will remember, the Alleghenies were branded as the graveyard of flyers and frankly I was somewhat worried.

It wasn't long until I was over them. They looked puny, after having seen the western mountains. The Waco's engine hummed beautifully and it was still early in the afternoon—I thought.

"Might as well set down at Harrisburg, gas up, then coast into Philadelphia before sunset," I mused to myself. I looked at my watch in Harrisburg. Five o'clock—on the nose. "Perfect," I thought. "Sunset's at six and I need 40 minutes to fly to Philly. It'll still be light when I get there. Then for that slow drive into town, a pleasant leisurely dinner with friends. This cross-country is great stuff. Absolutely nothing to it."

I set the nose of the plane toward Philadelphia and relaxed. Then I looked around, enjoying the last lap, the scenery and the pleasant drone of the engine. But it seemed to be getting dark awfully fast. In 10 minutes, the light was dim. . . . "Sun's behind the clouds," I thought. "Be out in a minute." But it got darker.

I still didn't realize that I'd made a terrible mistake. I had forgotten that we crossed the time-line—and hadn't moved my watch ahead. It wasn't five o'clock when I took off on that last lap; it was six! I kept peering down over the side, down at fields and villages which seemed to have no relation whatever to anything on my map. Brother, how different everything looks in the dark!

Within a few minutes the visibility was zero. Then I got really worried. I had no flashlight, no landing lights, no night flying experience. I couldn't even see my maps. But I was making around 120 m.p.h. and I consoled myself with the hope that shortly I'd see the lights of Philadelphia. I dropped down to 1,000 feet thinking that I could pick up some sort of landmark. All I saw were trees and a few pinpoints of light. Then I knew I was completely lost. When I still couldn't see anything that looked like Philadelphia, I figured that my compass had gone crazy and that I was off my course. (*Continued on page* 74)

World's Fastest Aircraft

plays safe with Goodyear tires, wheels, brakes

First ship to break the sonic barrier—Bell Aircraft Corporation's rocket-propelled X-1 is equipped with Goodyear tires, tubes, wheels and brakes. Designed to fly at a top speed of 1,700 m.p.h. under the full 6,000-pound thrust of its four-unit rocket engine, the X-1 has the strongest air-frame ever built. Naturally wheel gear must be super-safe, too, so Goodyear All-Weather tires, Goodyear Single Disc Brakes and Goodyear magnesium-alloy wheels were specified. Because it has proved standout in dependability, safety and performance under the severest service conditions on all types of aircraft, Goodyear tire, wheel and brake equipment is more widely used than any other make. To consult our engineers on any tire-wheel-brake problem, write: Goodyear, Aviation Products Division, Akron 16, Ohio or Los Angeles 54, Calif.

GOODYEAR AVIATION PRODUCTS

All-Weather—T.M. The Goodyear Tire & Rubber Company

MORE AIRCRAFT LAND ON GOODYEAR TIRES THAN ON ANY OTHER KIND

AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

AOPA IN PARIS

ALFRED L. WOLF (AOPA 5), AOPA's general counsel, is attending the general assembly of the Federation Aeronautique Internationale (FAI) in Paris. Mr. Wolf is representing United States private flyers at the assembly and is scheduled to participate in the private flying panel. Mr. Wolf, a prominent Philadelphia attorney and private flyer, flew from the United States to South Africa on business, then to Paris for the FAI assembly.

SEND ALL FACTS

AOPA members requesting service from national headquarters are urged to make a special check to see that their letters contain all possible facts before they are mailed. A number of members have had to wait undue periods because their first letters did not contain all information necessary for national headquarters to act. One other thing: *don't forget to include your AOPA registration number.*

SPIN FIGHT AGAIN

The fight to eliminate spins from both the private pilot's flight test and flight training has been renewed by AOPA in Washington. This stand has been recommended by the Non-Scheduled Advisory Committee of the CAA, of which AOPA is a member. AOPA contends that the emphasis should be on better and more training in stalls.

MAP SERVICE IMPROVEMENTS?

AOPA is giving serious consideration to complaints from members about the distribution and sale of up-to-date airway maps throughout the country. It appears that some changes in the present system for getting late maps into the hands of private flyers are going to have to be recommended. Before taking any final action, AOPA is asking members for suggestions as to how the map services now available might be improved. Send suggestions to national headquarters.

SINGLE STRIPS?

Staff members of AOPA are studying a proposal to limit the expenditure of any future Federal funds for airports to single-strip paved fields, with additional sod runways where needed. It is believed that this proposal might stimulate sounder economies in airports generally, and encourage the use of sites closer to cities because of the fact that large acreages will not be required. The advent of the crosswind landing gear—plus the fact that all modern airline and military aircraft, having tricycle gear, are designed to land and take off in substantial crosswind conditions—is behind this proposal.

AOPA ON COLLIER COMMITTEE

J. B. Hartranft, Jr., AOPA general manager, has been named to the nominating committee for the Collier Trophy Award, to be announced in the near future. Mr. Hartranft is primarily concerned with having a man or woman who has contributed to aviation in general and private flying in particular, considered by the final nominating group. AOPA members who wish to suggest the names of someone who has done much to advance aviation within the last year should send their suggestions to Mr. Hartranft at national headquarters.

J. B. Hartranft, Jr., is member of nominating committee for Collier Trophy.

NEW YORK, AGAIN

Now that the Port of New York Authority has purchased the airport at Teterboro, N. J. (across the Hudson from Manhattan), the last large field easily available to private flyers in the New York area has been taken over primarily for airline interests. AOPA has written the chairman of the Authority asking for a description of what airport facilities the private flyer visiting the New York area can expect to find in the future. Details are in the November issue of the AOPA PILOT.

CUT DANGER AREAS?

AOPA is working with CAA, the Air Forces and Navy in an effort to cut down the number of danger areas still restricted to flyers throughout the U. S. As a member of the Airspace Subcommittee of the Government's Air Coordinating Committee, AOPA is leading the campaign to cut danger areas to a minimum. According to J. B. Hartranft, Jr., AOPA general manager, a number of danger areas listed on charts no longer are being used for military purposes.

AIRPORT RATINGS

Certificates of merit have just been mailed to 717 airports throughout the United States by AOPA, following this organization's latest semi-annual rating period. Reporting cards sent in by AOPA members who have visited nearly every airport in the country have been compiled at national headquarters. Those airports achieving ratings of Above-Average or Superior have been mailed certificates.

Statistics based on this rating period, which ended July 31, indicate that servicing and facilities at the average airport are improving somewhat. The number of airports receiving the Superior rating was exactly double the number arrived at in the previous rating period. A special Pilot's Service Bulletin is being completed which lists all airports in the two categories. Members may get a copy by writing national headquarters.

WISCONSIN RESTRICTIONS

Restrictions against seaplanes by local communities throughout Wisconsin have been reported to AOPA by members in that state. National headquarters took the matter up with Wisconsin state aviation officials, who have assured AOPA that special legislation will be introduced in the state legislature which will give control of all Wisconsin waterways to a specially designated state organization.

ANTI-MONOPOLY

CAA's Airport Section has been asked by AOPA to reinstate the sponsor's assurance agreement section into their requirements governing any airport either wholly or partly paid for by Federal funds. This is expected to eliminate a number of existing monopolies at airports around the country, particularly those governing the sale of gasoline. The Non-Scheduled Advisory Committee of the CAA is expected to support the proposal.

REHOBOTH FLIGHT

AOPA's giant annual east-coast week-end flight to Rehoboth Beach, Del., drew nearly 400 planes and 1,000 people from 15 states and the District of Columbia. The flight was held during the week-end of September 11, and excellent weather arrived just ahead of the planes. Largest number of planes came from Pennsylvania (84), and one plane came from as far away as California.

The week-end featured two days of swimming, a shore dinner on the beach, sun-bathing, and a display of personal aircraft and equipment, as well as flight demonstrations. END

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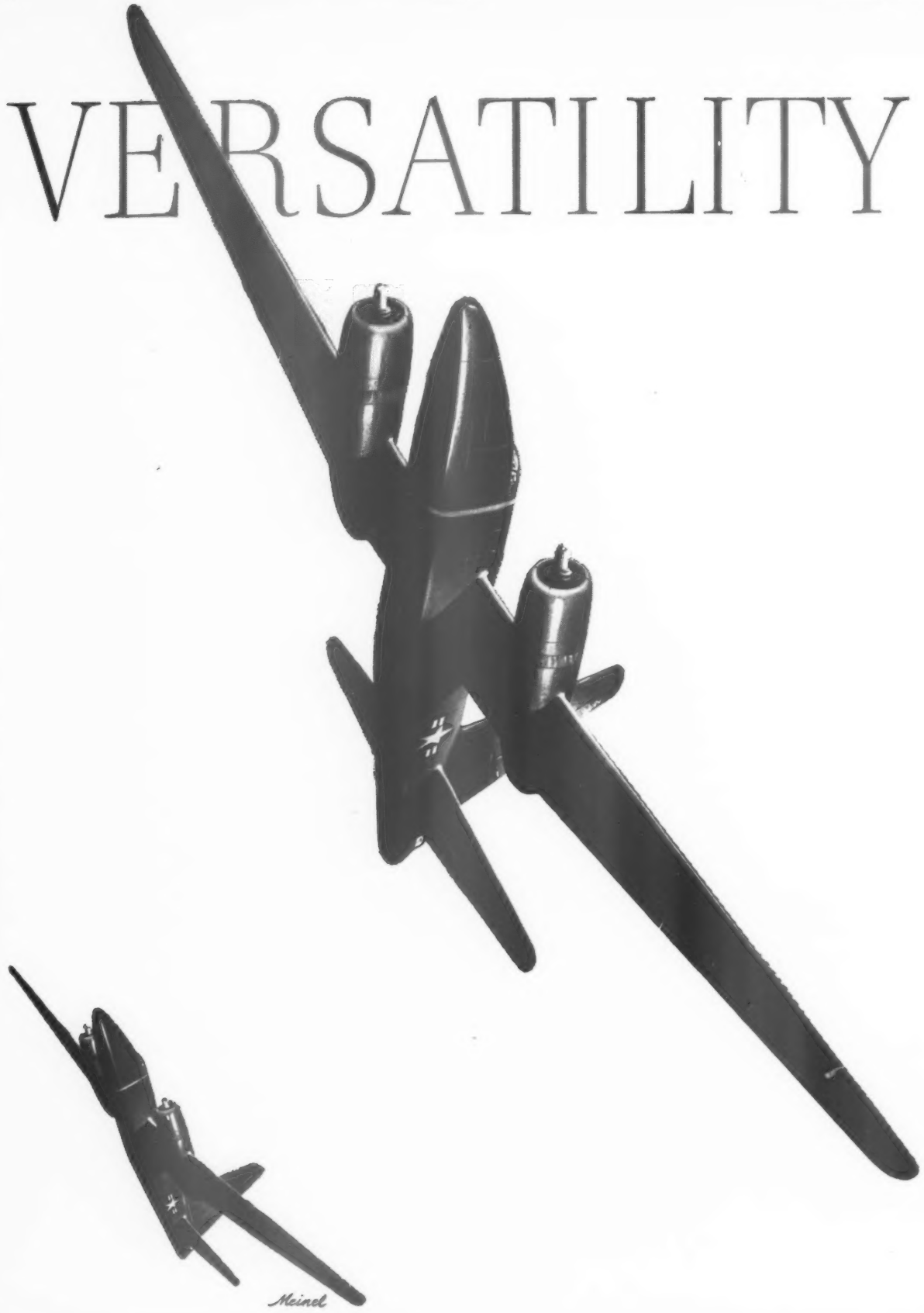

F-86

(*Continued from page* 17)

lage cross section."

Army and North American officials think that the F-86 is the cleanest plane aerodynamically now flying. They point out that the only "uncleanness" is in navigation lights demanded by the Civil Aeronautics Authority. They would be eliminated for combat duty.

To help safeguard this low drag aspect, rivet heads are even milled after riveting to cut down shock waves off of them. There also is super finishing around all imperfections.

Certain other important improvements must be kept secret at this time, although it was revealed that the cockpit dome is made of curved glass—a North American development. This has resulted in refraction and glare being almost entirely eliminated, assuring the pilot of good vision for gun aiming, and better all-around visibility.

Up until now most cockpit enclosures of the bubble type have been made of clear plastic because of the inability to shape glass to that configuration.

The dome will undergo a change in appearance on the 34th production model of the F-86, however, when the windshield is changed into a "V" shape.

AiResearch Company, Los Angeles, developed the cockpit refrigeration unit. They, along with Air Force and North American engineers, realized that in traversing the transonic speed range the pilot could stand only so much physical hardship.

Metal could be improved, perhaps reinforced, to stand transonic-induced heat of 300° and higher but no one can "reinforce" a human pilot. He must have refrigeration. And that he has, in a constant-temperature compartment.

While flying in the transonic range, the F-86 has developed temperatures as high as 300° on one section of the empennage. This has been "beefed up" with steel so that there will be no reversal of stress—like working a paper clip in your hand until the clip falls in two. Fatigue life of all metals, it is pointed out, is much shorter at altitudes where air temperatures are often below zero and where a speeding plane creates extreme heats.

The F-86 has a tactical radius of 500 miles and a service ceiling of more than 40,000 feet. Its speed in level flight is high because of the combination of the sweepback, the super thin wing and the small tail.

Production models of the plane are now known as the F-86A, the "A" being added as a result of the installation of the TG-190 jet engine. An even more powerful engine will be installed in a few months, FLYING has learned.

The plane has a wing span of 37 feet, an over-all length of 37 feet, and a height of 14 feet. Landing gear is tricycle, with a steerable nose wheel.

In his first flight with the XF-86, Welch was aloft for nearly 50 minutes, about 40 of which he wrestled with a malfunctioning nose gear. It wouldn't come to down position. Welch prepared to land on the main gear and let the nose settle to the ground, although he realized the air duct might dig in and that he would ground loop—and possibly flip over. Just as he touched the runway, however, the nose wheel dropped to a locked position.

On approximately his 15th flight, with the less powerful TG-180 engine, he reportedly power-dived through the speed of sound.

But now with the new TG-190 which goes into 554 F-86As, and with something still newer and more powerful to be installed in 120 F-86Cs, supersonic speeds may well become an everyday chore to the boys who fly the new fighter. END

FLYING

"Go tell the passengers to fasten their safety belts—then see what that comic book says about landing."

The Lockheed P2V Patrol Bomber

The Lockheed P2V Navy Bomber is well known for its ability to fly farther than any other plane in the world today.

Not so well known is the effectiveness of the P2V for:

Multi-engine training
Strategic transport
Long-range reconnaissance
Sea search
Tactical photography
Aerial mine laying
Torpedo action

These are some of the many uses of the Lockheed P2V Patrol Bomber, the Navy's versatile holder of the world's long-distance nonstop flight record (11,236 miles).

LOOK TO LOCKHEED FOR LEADERSHIP

Lockheed Aircraft Corp.

Burbank, California

Submarines

(*Continued from page 21*)

defense—split-second fire control, proximity fuses, long-range, early-warning radar, guided missiles and so on—may some day reach a stage of development where they render the piloted military aircraft obsolete.

"If this day comes," he continued, "our undersea experts foresee a dependence on long-range submarines capable of submergence for months, whose ability to fire rockets and guided missiles without surfacing will allow them to stand off any coastal target in the world and destroy it."

World War II saw submarines and airplanes, acting individually, as the outstanding destructive weapon carriers. World War III, if it comes, will inevitably see the two operating together.

Actual operation of submarines and airplanes together is not new. As long ago as 1926 the U. S. Navy had a submarine equipped with an attack aircraft hangar and a search plane. The combination was used merely to increase the scouting range of the sub and was soon abandoned. But it was an idea.

When World War II came, however, two nations had submarines that could launch aircraft for scouting or attack. The Free French had a submarine that carried planes in a hangar on deck, but the sub was lost in 1942 without having been tested adequately.

More memorable in the minds of Americans are the plane-carrying subs of Japan, one of which reportedly launched an aircraft that flew over the Pacific coast during the war. The plane did no damage and the continental limits of the U. S. never were bothered by sub-launched Jap aircraft again.

Later, documents captured from the Japanese showed that their subs were inadequate for this purpose. They were large and bulky, required much fuel for operation, and could only hit with one punch at such extensive range. The original Japanese plan was to use a fleet of these I-14 type subs to launch planes against the Panama Canal. Had the plan succeeded, American Naval forces in both the Pacific and Atlantic would have been sadly hampered.

Later in the war, the Japs built three larger subs which carried three planes in a deck hangar. They never saw action but the trend has caused American naval engineers to make a thorough study of their construction.

The atomic bomb has raised new Navy concern for its surface fleet. Methods of attack with little or no chance of being detected are necessary. Only underwater travel, safe from the probing eyes of radar, affords this and Navy minds have turned towards the perfection of better and faster underwater craft.

Paralleling the plight of the "battleship" Navy men is that of the pilots and the carrier boys. The time may come when pilotless aircraft and guided missiles will eliminate human pilots and their warplanes.

With the end of World War II, aviation and ordnance specialists hastily began to study German developments on guided missiles and submarines.

Since old-fashioned submarines were vulnerable when they surfaced to recharge their batteries, the Germans sought to perfect a sub which could travel submerged for long periods of time, seldom have to surface, and which could summon emergency power to travel submerged at speeds comparable to surface craft.

Their triumph was the Type 21 submarine, equipped with a device known as *snorchel*. With *snorchel*, German subs were able to stay submerged 40 to 70 days at a time and cruise thousands of miles underwater without surfacing. Admiral Doenitz, head of the German Navy throughout the war, claimed a Type 21 sub went 72 days without surfacing, covering 22,000 miles.

Snorchel, which is of Dutch origin, is a tube which breathes air from the surface into the sub so that the batteries can be charged while submerged at periscope depth. It automatically closes when the sub drops to lower depths.

Fleet Adm. Chester Nimitz said that if these underwater boats had come along before 1944, the course of the war might have been radically altered.

By the end of the war the Nazis had the plans drawn and hull constructed for another type submarine. Known as Type 26, the sub was supposed to be capable of operating indefinitely below the surface, would cruise on Diesel engines at *snorchel* depth, and could muster 25 knots in an emergency by means of a Walter gas-turbine engine.

On the Type 26 the Nazis were to use a new type *snorchel* of periscope height, much less bulky than the old design.

The Germans had also developed a hydrogen-peroxide engine for sub propulsion which worked on rocket principles without outside oxygen. The oxygen was carried in the hydrogen-peroxide solution which was broken down in a chamber of the engine.

But propulsion was not the only interesting development which German submarine engineers had made. By the end of the war the Nazis had tested, but not used operationally, underwater rockets. They were fired at ships and other submarines from tubes which, unlike normal torpedo tubes that are stationary, could be elevated and trained like guns. The rockets were good for short-range only but they foretold the possibility of longer range underwater-to-air- and/or-surface as well as strictly underwater rockets.

German developments are being adapted into the overall naval and military picture of the U. S. U. S. submarines are being modified to include the *snorchel* device and streamlining effects to get greater speed. The tests of the *Cusk* also point up our interest in German developments.

One thing seems sure. The best way for a nation not equipped with long-range strategic bombers to attack the United States would be by bomb-carrying submarines. Perhaps, with atom bombs, the submarines would even be better than big bombers to hit coastal targets.

But would these bombs be delivered by airplane or by guided missile?

Even now the guided missile seems to be the best answer. Navy authorities have almost completely ruled out the airplane on submarines. Planes demand lots of storage space, which is at a premium on subs. They would have to be small and light, and be able to carry only small bomb loads. There is the difficulty of launching them—the Japs used catapults. Even more difficult is the problem of landing them on their return. The Jap pilots had to crash-land alongside and get back aboard as best they could. During the period of landing, the subs would themselves be vulnerable—especially so if the attack were made from close-in. Defensive planes could follow the attackers back to the mother sub.

The main thing that rules out piloted aircraft is that guided missiles of greater size, power and range can be launched from a submarine as easily as can planes. They do not need to return. The U. S.

15 YEARS AGO

FROM the November, 1933, issue of this magazine:

Tito Falconi of the Italian Air Corps, a specialist in upside-down flying, broke the endurance record when he flew in an inverted position all the way from St. Louis, Mo., to Chicago, Ill.

The Farman Monoped was a low-wing monoplane of the single-wheel type, a product of the Farman Airplane factory in France. Performance was said to be remarkably improved by eliminating the usual two-wheel landing gear. The wheel was shrouded in a casing with a curved tube radiator at the nose of the shroud. Rubber sprung sprags at the wingtips held the plane level when on the ground and when in flight the sprags were drawn up flush with the under surface of the wings so they gave little resistance.

Total number of planes manufactured during the first six months of 1933 was 669, of which 306 were for civilian use. This included 215 monoplanes, 84 biplanes and seven autogiros.

First place in the woman's race at the International Air Races in Chicago was won by Mae Haizlip. Average speed for the 50-mile course was 191.11 m.p.h.

An improved de-icer with a new weight medium was perfected by United Air Lines engineers in collaboration with Goodyear Rubber Co. Weight was reduced from 150 pounds to 45 pounds by substituting balloon silk for rubber edges cemented to the top and bottom surfaces of the wings and stabilizers. The de-icer was tested under icing conditions at 19,000 feet.

TWENTY YEARS AGO

At the National Air Races held in Los Angeles, Col. Charles A. Lindbergh declared, "I have never seen such flying." He came just to look, but flew as a substitute for Lieut. J. J. Williams of the Army stunt trio, who was killed during the meet. Planes at the field numbered 761. Of these, 461 were participants, including 161 Navy and 125 Army planes.

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Navy has, therefore, turned to considering pilotless aircraft.

Fleet Admiral Nimitz, an old submariner and former Chief of Naval Operations, says that no method NOW exists for firing rockets while submerged. But he points out that submarines are presently capable of surfacing and resubmerging in 30 seconds. Nor does he rule out the possibility that eventually rockets can be fired from a submerged position.

Engineers have envisaged a plan whereby underwater firing of guided missiles is possible. The sub would first release a radar float to the surface for the purpose of controlling the missile. Immediately afterward, a collapsible platform would unfold at the surface to serve as a base for launching a missile with an atomic warhead.

In the same split-second the platform unfolds, auxiliary rockets would launch the missile into the air. On reaching an altitude and speed where the ram-jet engine of the missile could operate, the launching rockets would be jettisoned. Under its own power the missile would roar to its target guided by radar.

This idea is, for the moment, just speculation. Despite the progress of the Germans with underwater rockets, a number of negative features weigh against it, including size, power, water pressure problems and so forth.

What is more real and currently more pressing is the possibility of firing guided missiles from surfaced subs. Let's consider the problems involved here.

The *Cusk* is conducting its tests against shore and ship installations. The tests are being made with V-1 type guided missiles. Engineers claim that the V-1 can be controlled upwards to 300 miles, but absolute control passes at a maximum of 50 miles in tests to date. Ability to control missiles at greater distances is increasing, but investigation will show that the present 50-mile maximum is enough to destroy the biggest part of industry located along a coastline. By far the largest part of our active industry that can produce war materials is within range of such missiles.

Adequate defense would be difficult. Guided missiles such as the V-1, powered only by jet propulsion, can be shot down if they travel far enough to be tracked by radar. But in a surprise attack on a coastal area such missiles would strike almost before the defense could plot their path. The V-2, powered by rocket, travels too fast for adequate tracking and no defense against properly guided rocket-power missiles is on the horizon.

The possibility of jamming the controlling frequency offers one hope, but in a surprise attack the damage would probably be done before the controlling frequency could be located and jamming gear got into operation.

With little if any further development needed, the conclusion is inescapable that an enemy nation equipped with a fleet of submarines can attack any country with an ocean shoreline. With atomic warheads, such an attack can destroy any factories or cities within the 50-mile effective range of guidance today.

Five of the 10 largest cities of the United States are within reach of such attacks.

The submarine's effectiveness for this job is further enhanced by the fact it provides such a small *target* for defensive atomic missiles, but is capable of carrying highly-destructive atomic missiles for *offensive* purposes.

Today only a few nations have extensive submarine fleets. The two largest are those of Soviet Russia and the United States. The Russians have been devoting almost all their naval strength to submarine development. They have the *snorchel*, extremely modern submarines, and even more access to the late German developments than we did.

These possibilities are not pipe dreams looking to any distant future like much of the guided missile stuff. They are ever present real perils, here today. Even in 1946 Admiral Radford reported on plans the Germans had to attack our Atlantic coast defenses by submarine-launched rockets.

The secrecy of submarine attack is its big advantage. The enemy can be approached underwater. Electronic waves, on which radar is dependent, cannot penetrate water. Sonar sound detection equipment is effective only at the comparatively close ranges of 2,500 to 3,000 yards. If a nation doesn't have the planes —and maybe even if it does—the obvious method of a sneak attack is by submarine. END

SPHERE CHART

LONG RANGE air navigation is simplified with a spherical chart devised by Col. Carl J. Crane (above), commanding officer of March Field, Calif., Air Force Base. The chart, which is actually a section of a globe 13 feet in diameter, eliminates correction or distortion problems in navigating.

With available maps, long-distance straight flights require a number of Ageton problems to determine initial course and distance, and an additional problem for each course correction. A 3,000-mile flight involves a minimum of 11 problems, taking approximately 55 minutes. The same course could be plotted on the sphere chart in less than 60 seconds, and the distance can be measured accurately.

Charts are made of plywood and acrylic plastic, which can be inked over and erased completely. This enables them to be used indefinitely.

The sphere chart is of necessity large (though Colonel Crane says a section showing the U. S. can be reduced to half the size and still be practical and workable with only a plotter and a "straight edge.") Too bulky for a private plane, it has to be operated by a navigator at a navigator's table.

To cover the United States, a 56 x 27 inch portion is required. It can be folded to conserve space (see inset). Two sections (each 24 inches long and 12 inches wide) will cover a flight from San Francisco to Hawaii. Scale is approximately 50 statute miles to the inch, giving the navigator a chart of usable scale upon which to plot flights of long-range, fast aircraft.

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Listen to the CHAMPION ROLL CALL . . . Harry Wismer's fast sportscast every Friday night, over the ABC network

First Cross-Country

(*Continued from page 27*)

plot of forces—or velocities—was indispensable to scientific navigation.

So, picking up a piece of white paper, Audrey drew a straight line to represent true north. The north end of the line she labeled *N*. Then, from an arbitrary point *E* on the true-north line she drew another line at 192°. That was her true-course line. She still had to plot wind direction and velocity. Remembering what the Teterboro tower told her, she drew a line from 150° intersecting the true-north line at point *E*. *Beyond* point *E*, she used the scale on her plotter to make the wind velocity line 18 units long, as wind velocity was 18 m.p.h. The rest was simple: She again used the scale on her plotter to measure 100 units, representing the Cessna's 100 m.p.h. air speed. Then, with the end of the wind velocity line (which she had labeled *W*) as a center, she used the 100 unit measurement as a radius, describing an arc which cut the true-course line at point P. When she finished, her plot looked like Figure 1.

From this simple plot she was able to get some basic information. By measuring the line EP with her plotter scale, she found the estimated ground speed to be 87 m.p.h. She had known it would be less than the air speed because the direction of the wind was such as to impede her. She was also able to find her true heading by measuring the angle formed by the line WP and the true-north line (measuring in a clockwise direction). It was 186°.

It had taken only three or four minutes to draw the plot and get the exact facts. Audrey couldn't have used the time more profitably. The plot eliminated guesswork and rule-of-thumb figuring. It helped emphasize the effect of wind on ground speed and heading. Later, Audrey would learn to solve these problems with a computer in a few seconds, but she would always have the basic understanding of the "triangle of velocities."

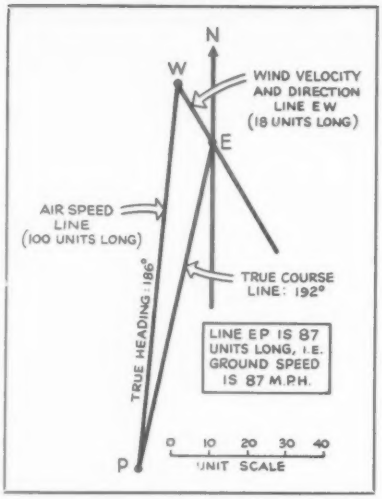
N
W
WIND VELOCITY AND DIRECTION LINE EW (18 UNITS LONG)
E
AIR SPEED LINE (100 UNITS LONG)
TRUE HEADING: 186°
TRUE COURSE LINE: 192°
LINE EP IS 87 UNITS LONG, I.E. GROUND SPEED IS 87 M.P.H.
P
0 10 20 30 40
UNIT SCALE

Figure 1.

Her next step was to correct the true heading for variation. Audrey knew that magnetic compasses point to the magnetic north pole, which is not the same as the true north pole used in map making. Looking on her sectional, Audrey saw that the variation in the vicinity of Teterboro was 11° west—so she added 11° to the true heading of 186°, giving her a magnetic heading of 197°. (Early in ground school she had learned the basic rule: *add* westerly and *subtract* easterly variation.)

One final step remained. She still had to correct for deviation. Audrey had seen in class how a compass needle could easily be deflected from pointing to magnetic north. Any metallic object possessing magnetic properties could do it. And every airplane carries such objects. She had also seen actual compass cards for specific planes showing the amount of error or deviation in each direction (at 30° intervals). For the plane she was going to fly, NC 18350, the deviation on the magnetic heading of 197° was about 4° west. Applying the rule (*add* westerly; *subtract* easterly), she finally had what she wanted. Her compass heading was 201°.

She had been cautioned by her instructor against the erroneous view sometimes expressed around private airports: that deviation doesn't matter because it's too hard to hold a heading in light aircraft to within 3°. That would be like a railroad deciding to throw away its timetables because it is so difficult to meet them exactly. Actually, the more exact the heading, the greater is the chance of flying the desired course. Audrey hadn't been flying long enough to develop stubborn misconceptions so it was easy for her to accept procedures recommended by her instructor.

After determining the compass heading, she began the more practical part of planning her cross country trip: the choice of check points. Atlantic City is 102 miles from Teterboro. The instructor didn't believe in taking this distance and chopping it up into even intervals of space. How much real help would it be to Audrey to have an ETA (Estimated Time of Arrival) for a point 20 or 30 miles from Teterboro if there was nothing prominent to catch her eye when she reached it? It was better, he reasoned, to pick out a few prominent check points.

They began with the Newark Airport. That would stand out, even if she weren't looking for it. There were six more such check points, each of which would almost force itself on her attention. They were the upper and lower boundaries of Raritan Bay, Freehold, Lakehurst Airport, Coyle's Airport and Great Bay, in that order. Some were not directly on course but they were easily within range of vision. An outstanding check point slightly off course is better than a so-so check point dead on course, the instructor said.

Audrey took over from there. She measured the distance from each check point to the next. Using her known ground speed of 87 m.p.h., she calculated how many minutes each leg would take. It was simple arithmetic, dividing the distance by the rate in order to find the time. She wrote the figures on a small pad. There was no use writing down the actual ETA for each point because she didn't know exactly what time she would be at cruising altitude over Teterboro. She might linger five minutes or more at take-off point before she got tower clearance. Teterboro could become very busy.

"Your course goes right between Lakehurst Airport and Lakewood," the instructor said to Audrey. "Why don't you use those two points as brackets to check your compass heading? See if it's still about 200°. The wind may have shifted some. But whatever your C.H. is there, that'll be the one to fly with to Atlantic City."

And that ended the navigation prelim-

FLYING

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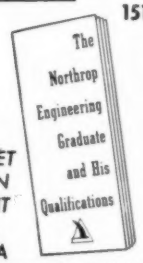

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LOGGING TIME

WITH HY SHERIDAN

Captain, American Airlines

HIDDEN TORNADOES

Once I flew a rescue mission to a tornado-stricken area in northern Texas and there I found a high school girl whose clothes, including her panties but not her tight-fitting brassiere, had been snatched from her by the wind.

Now consider the Northwest Airlines crash a few weeks ago near Fountain City, Wis. Seventeen miles from the crash a pair of pants was found without the passenger in them; only a tornado does things like that. Parts of the airliner were found, by luck, about seven miles away, on or near a race track. Something exploded. What could this be but an internal tornado? (See "Stay Away from Thunderstorms," FLYING, November, 1946.)

Little by little evidence is coming in to support my concept of the internal tornado. They seem to be rare things, fortunately, or are so small and short-lived that no one gets much practice hitting them. It is clear that for safety reasons we should know about this thing.

* * *

AUTOMATIC FLIGHT. The airline pilot had filed a VFR flight plan and he was chawing through the air thinking lovely thoughts. His co-pilot tapped him on the arm and said, "I bet there isn't another pilot in the country who could fly VFR in this weather."

They had been blind for several minutes and the captain hadn't noticed it. Flying on instruments gets to be pretty automatic after a few years.

* * *

NOTES ON THE COMICS. No wonder the congressional committee thought Hollywood was full of commies. According to the newspapers the movie people spend all their time on their complexes, complexions and complications.

* * *

I asked one stewardess what she thought of my column. She said it convinced her there are more tailwinds than there are airplanes.

* * *

ECONOMIC SQUAT TAG

I was bemoaning the fact that the airlines are about as seasonal as baseball, and I mentioned that it was too bad that the industry was not like the detective business which is always at a peek.

Traffic begins to increase in the spring and by the time the airlines get prepared for it, why it is nearly fall and the customers taper off. Then by the time the airlines establish economies for the slump, spring is here and the scramble to get ready is on once more.

When fall comes and business begins to slump, the cost figures loom up above the revenue figures. There is only one thing to do: fire a goodly number of people that they spent the year (and lots of money) in selecting, hiring, and training, consisting of all kinds of workmen, including mechanics and pilots. That has to be done, and we can always hire them back in the spring, don't you know. Except that we can't.

Thus it is that every spring the airlines go out and hire men. But they have to hire most of them from among the unemployed. Most of the unemployed are unemployed because they either could not get a job or could not hold one.

Every year, year by year, the airlines have been lowering the quality of their employes, to say nothing of the morale thereof.

The results of this economic squat tag are now at hand. During the past year everyone with a dictionary has written his idea about what is wrong with the airlines. Well, here is my idea, in addition to the thought that the passengers no longer fly for the honor of it.

Your fleet-footed reporter would like to say that he thinks that this is the last year that any airline will be rich enough to afford this economy.

(The managements are, truth to tell, now really beginning to work on this problem. Why, even some of the vice presidents are laying away their comics.)

* * *

OPPORTUNITY. They are going to put a third man in the cockpits of the big airliners, but we don't know yet what the qualifications will have to be. Sadie says she doesn't know which we need most, a lawyer or a chaperon.

* * *

MONTHLY EPITAPH

Here lies the pilot who didn't last:
He came in slow but he went out fast.

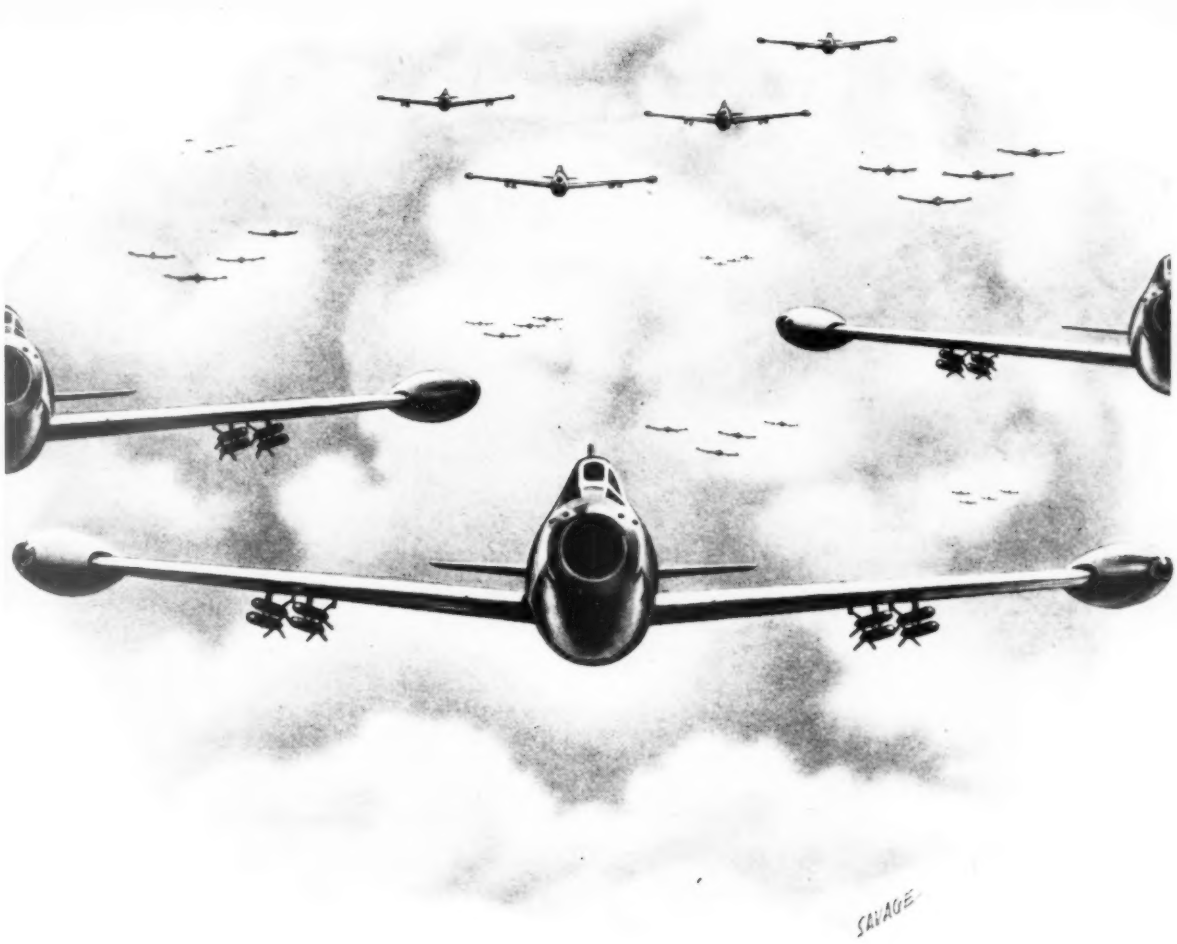
inaries. Audrey Ludlow walked out of the schoolroom as well prepared as any student (or, for that matter, any experienced flyer) could be. She had an accurate compass heading and she had reliable check points. Above all, she had confidence born of a knowledge of basic principles of navigation. The instructor watched her walk up to NC 18350, the Cessna she was to fly. Although the plane had been gassed and oiled by a helper, she had been taught to take nothing for granted. She checked everything herself: gas, oil, free movement of controls, external appearance of the plane, etc. In class she had been given the case histories of several crashes which could have been prevented by a preflight inspection. The prospect of getting grease on her hands didn't deter her.

Five minutes later, Audrey was carefully taxiing out, unrattled by big stuff and little stuff rolling past her. There were advantages as well as disadvantages in learning to fly at a busy terminal like Teterboro. At 10:42 a.m., Audrey's Cessna left the ground. A minute later it vanished toward the south. And under the press of other work the instructor forgot about Audrey for the next three hours. It wasn't until after lunch, when he saw NC18350 turning off the ramp into the Rausch strip, that he realized she had been gone all that time. He waved to her as she climbed out of the plane.

She reported that everything had gone well. On the return trip she landed at Camden. At Atlantic City she made another navigation plot. The wind had remained about the same, and increased her homeward ground speed to approximately 112 m.p.h. And even though she hadn't needed them, she had worked out compass headings to Camden and then to Teterboro. All the check points had come up almost exactly on schedule.

Here's a summary of the simple, conventional steps followed by Audrey Ludlow in planning her cross-country:

1. Draw a line on your chart from base to destination. Use a protractor to determine the true course.
2. Plot a triangle of velocities, using the above true course, the wind direction and velocity, and the airspeed of your plane. Be sure to scale off the wind velocity on the side opposite to the quadrant where the wind line originates.
3. Obtain your true heading and ground speed from this plot, using the system explained to Audrey.
4. Apply variation to the true heading (*add* westerly; *subtract* easterly) to obtain magnetic heading.
5. Apply deviation to magnetic heading to get a compass heading.
6. Fly the compass heading.
7. Select prominent check points by studying your maps. If possible, ask someone who has flown the route to suggest the best check points. Using your probable ground speed (obtained from the triangle of velocities), compute the time it should take you to fly between check points.
8. When check points indicate you are on course, see what your compass reads. That will verify, or enable you to adjust, your compass heading. END



PERFECTING ON SCIENCE...

When you see a jet propelled Air Force fighter or bomber plane speeding overhead . . . consider the time and effort taken to get it there. ¶ The REPUBLIC F-84 THUNDERJET first flew in February, 1946. Leading up to that important day, well over 500,000 engineering manhours were spent in putting together what was then known about the vexing problems of jet propulsion and high speed performance to create the first of these now-famous 600 mph jet fighters. ¶ Since then, several hundred Thunderjets have taken their place with various groups of the USAF . . . Another half-million engineering manhours have added greatly to the performance and utility of the F-84 . . . To keep abreast of changing operational techniques, more than 400 major design improvements have been made between the first prototype and today's F-84C. ¶ And that's not all. New jet developments, along with new experiences in actual Air Force operations, are expected to require at least 300,000 engineering manhours per year, in order that the THUNDERJET will consistently satisfy ground crews, pilots and commanders . . . maintaining its leadership among the modern planes assigned to guard our peace and security.

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Co-Op Airport

(*Continued from page 29*)

what was happening practically all the time.

These moves paid off in more than good will. It took the council out of the airport business and helped make the city fathers friendly to the new group. It also won for the corporation a $5,000 appropriation for airport improvements, plus free taxes and free electricity for 10 years. The Borough also removed hazardous high tension lines at the end of one runway and marked a telephone low slung cable.

Operating capital was obtained through $800 investments from each of the original directors who also signed notes for an additional amount to be paid out of earnings, if any, from stocks. The directors were then ready to start work on the field.

They cleared and leveled it during the spring, and dug foundations for the administration building and four individual hangars. By June, these buildings were ready for business and a contract had been signed for a Veteran's Administration primary training school.

They redoubled their community efforts. Dr. Tice—because he saw so many persons in line of duty—and George Setman went to town. They sold stock at $5 a share to townsmen, half because they wanted money to expand, half to win personal interest in the field. Between the two of them they interested 241 investors.

"Many will never fly," Setman said realistically, "but all are interested in the community having a successful airport and they don't hesitate to round up students and prospective plane purchasers."

Between times, the quintet went out of their way to sell aviation and the airport to the Rotary Club and other civic groups. Again the emphasis was on *active* participation. The Quakertown chapter of the National Aeronautics Association purchased a B-24 and flew it into the field where it is now an air marker and available for use as a vocational project for the high school. More recently it was turned over as a meeting place to a newly-organized Air Scout Squadron.

When Hobart Biehn, civic-minded Chevrolet dealer in Quakertown, hit on the idea of installing an old glider on the field, he was welcomed with open arms. The directors converted it into a snack bar and made a small stockroom out of the glider box.

A flying club was organized for Rotarians, as well as a "Century Flying Club" for other townspeople.

About that time, relaxing might have seemed in order. But George Setman looked at the community and came up with more ideas.

The result was a project which has been named Bucks County Enterprises, headquartered at the airport and aimed at answering urgent community manufacturing needs as well as taking up the financial slack during dull flying seasons. The "enterprises" today consists of a small but well-equipped metal working shop which takes orders from local industries in need of a skilled subcontractor in metal work.

It is run by Harold Johnson, an aviation technician who sweated out the war designing and making aircraft parts.

The shop differs from the usual airport type because special tools have been added to meet demands of Quakertown citizens. There is a box-and-pan brake, a large shearing machine, and other gadgets capable of turning out such items as aluminum wastebaskets and assembly trays, television tube trucks used by radio tube manufacturing concerns (Philco, RCA, and Sylvania). Recently the shop designed, built and installed a water-tank for testing automobile radiators at a local garage, and Johnson and his crew are willing to tackle anything asked of them. An electronic chime manufacturing concern in the next town now has its cabinets made of aluminum instead of steel at Bucks Co. Enterprises. Pilots, line boys, instructors and board members help out when the field is socked in or a rush job is on the books in the cow barn.

Setman and his company are the first to point out that they don't have a big-time fixed-base operation. It's a small-town fixed base, period; and the boys are not out to make millions.

But they are vocal in pointing out that at their first stockholders' meeting last year they showed a profit of $1,600 after payroll and taxes—and that this year the figure edged up a few hundred more.

Nor are they emphasizing the "community" angle so strongly that the flying end of the business has suffered. They sell flying everywhere they go—and, as the lead of this article indicates, to everyone who lands at the field.

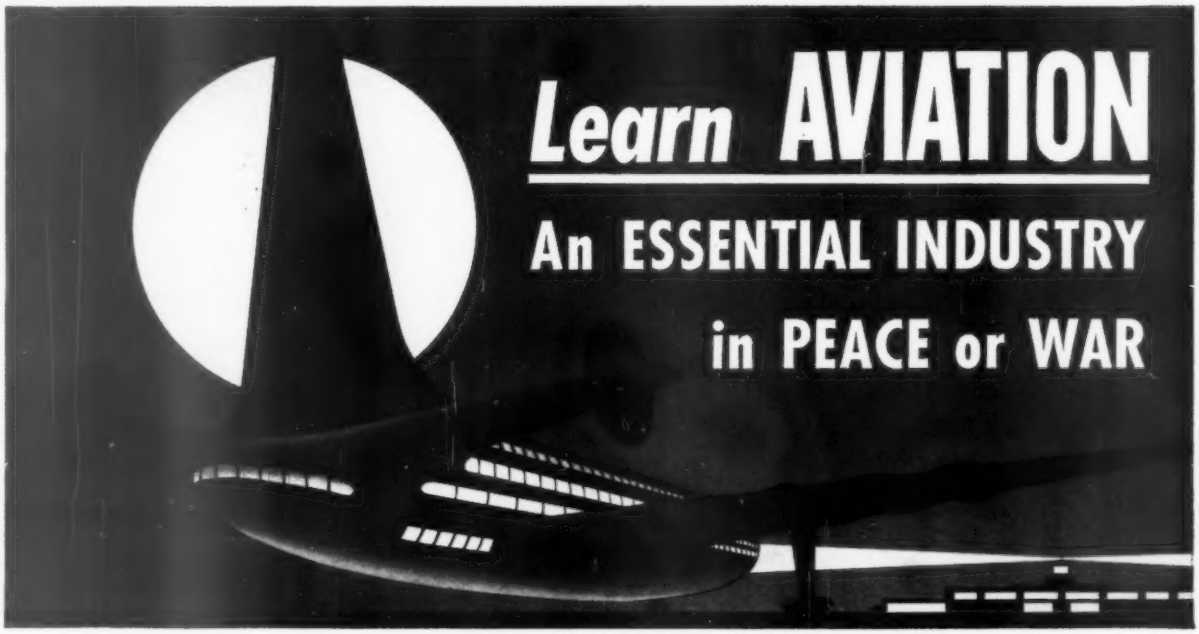
So far they have 104 logbooks in the airport office. Ninety-one ex-GIs have completed training, 76 private pilots have won licenses, and the advanced training score includes five instructors, two A&E mechanics (with two others in training) and one airport custodian. The corporation owns 12 planes and has eight hangar customers. The original four hangars have increased to eight, plus a 40x60-foot hangar.

Roger Taylor is now a certified CAA Flight Examiner and Shaeffer Hillegass is a designated Aircraft Maintenance Inspector. The field won an NAA Good Airport Operating Practice certificate for both 1946 and 1947.

But when Setman and company sum up their place in the aviation world they do not overlook the point that they have been making since the airport was a gleam in their collective eyes. The point is obvious when visiting pilots have their planes serviced by mechanics, the airport manager, a doctor, a member of the board of directors—or even the office girl.

"We feel," Setman says simply, "that we are unique in the airport business because over 200 of our townspeople *own* the airport." END

"It's all right now, sir—we landed an hour ago."



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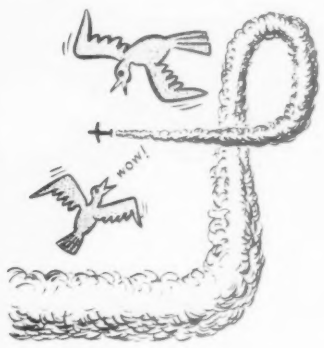
F-11

An Elephant Sat on Me

DON'T let everyone tell you that flying the jets is like riding a Beauty Rest mattress. Maybe it is—sometimes. But it wasn't like that on Labor Day when I flew the speed test course set up for the F-86 at the National Air Races. Here's how a strictly low and slow flyer feels in the Lockheed TF-80 on a gusty day.

I was piloted by Col. Albert Boyd, chief of the flight test section at Wright Field. He flew the TF-80



over the F-86 course to see whether conditions were okay for a new attempt to break the record that day.

Two Air Force men tied me down in the back seat. The TF-80 cockpit seems roomy enough, but after they had strapped down my shoulders and legs, and tightened a safety belt in addition, I really was squeezed into that seat.

I never realized how big my head was before. I forced the crash helmet on with a great deal of twisting and manipulating. It was so tight my ears lapped down like a spaniel's. It was almost impossible to shoehorn them upright again, but by tugging and squeezing, I finally made it.

When Colonel Boyd taxied out on the runway I felt a little warm around the region of my left ankle. I felt down there, and sure enough the heater was on full blast. I'd always heard how jets are slow on take-off, but we seemed to get out plenty fast. We climbed to altitude and maneuvered to come in across the speed course.

It was then I felt G's—real hard G's—for the first time. When Colonel Boyd banks the TF-80, he *really* banks it, and I scrunched down in my seat as if an elephant were sitting on me. The G-meter read slightly over four. I figure I weighed just over 900 pounds at that time. I could feel the flesh of my cheeks sag. I tried to raise my right arm. It was as though a sack of flour were tied to it. My arm weighed maybe 50 pounds.

Then we came diving across the field about 300 feet high. I got a little confused here and transferred my attention from the altimeter to the airspeed which was registering maybe 570. We went across the three kilometer course in around nine seconds.

It was bumpy. The closest I can describe the sensation is that it is something like riding a hydroplane at high speed across choppy waves. Even though I was strapped down as tight as possible I was bouncing in my seat and my helmet was banging against the canopy.

And then we began to climb. And what a climb. We went from around 300 feet to over 7,000 in only a few seconds. My ears just about blanked out. All I could hear over the built-in headset was a thin voice from a long way off. I swallowed like mad but my ears wouldn't clear.

Meanwhile I hadn't forgotten about that damned heater. A couple of times I felt my left leg to see if my shoe was getting scorched. Added to the heat from the heater was the fact that it was about 90° outside. In addition, when you get up over 500 m.p.h. the air ramming in and streaming by the plane heats by natural compression. I've never been hotter in my life.

We gradually lost altitude from there and came in for a normal landing. The finest breath of air I ever took was after we hit the runway and Colonel Boyd opened the canopy a little bit. That 90° wind streaming in felt like a refrigerator.

We taxied down, parked, and Colonel Boyd tilted the canopy the whole way. This time I didn't have much trouble getting the crash helmet off. I guess my head was cut down to size. My ears still weren't right, but I asked Colonel Boyd if it wasn't pretty hot in the plane. "Yes," he said. "There's something wrong with the heater. We can't shut it off."

We had flown 610 m.p.h. across the course and had accomplished our mission—found it wasn't safe for the F-86 to try to break the record that day. We had experienced gusts of plus 4 G's and minus 2 G's, or maybe it was the other way around.

One reporter strolled up and remarked about how calm I looked. I guess I was just stunned. A couple of days later, Betty Skelton, national women's aerobatics champion, who had gotten to go up on a regular demonstration flight, came into the office and said, "wasn't it wonderful?"

Well, on second thought, maybe it was.

—Curtis Fuller

Flapping Wing

(*Continued from page 40*)

top and bottom of the stroke. At this point, however, the wing itself, in changing angle, creates a thrust backward. If this velocity of thrust is equalized, then the flight action will be smooth.

In this way we have obtained thrust by flapping the wings up and down. If we increase the power until this wind becomes 50 m.p.h. we will then have all of the air velocity we need.

In other words, *instead of moving our airplane over the ground until we get speed enough for the wings to take us off, we use the entire wing area for a much more efficient propeller and create the 50 m.p.h. wind while we are standing still.* The same power can bring us down, vertically, with safety proportionate to the accuracy of the control.

Try some experiments yourself.

In the upper sketch of Figure 2 is an

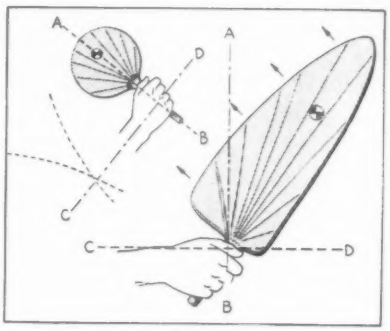


Figure 2

ordinary round palm-leaf fan. It is held straight in the hand and twisted up and down, around the axis C-D, with the air blast travelling on the line A-B, as shown by the arrow, so the air blows in your face. A round *wing* would, however, be very inefficient.

If we are going to get lift and ceiling we will have to have "aspect ratio" to the wing. So, in the lower sketch of Figure 2 is a long narrow "insect wing" fan but made structurally corrugated like the ordinary palm leaf fan. It will be noted, however, that the handle is well toward the forward edge of the wing or fan and that the widest part of the fan is closest to the hand.

In this fan, instead of rotating the wrist axis with the fan length at right-angles, the line C-D, which is the pivoting axis, is at a considerable angle to the line of the handle, so that the flexing is almost at 40°. This motion, while keeping the front edge of the wing in about the same line, waves the back edge of the wing up and down in unison with the up-and-down motion of the outer tip of the fan or wing. With this fan you can blow a rather surprising blast of air from the entire length of the fan and in the direction of the small arrows.

The insects, using this means and this shape of wing, have an "angle hinge," which works as is shown diagrammatically in Figure 3.

The dotted V-abc shows the angles of

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the wing hinges on either side. These hinges not only slant in plan view, but as you will see in the upper sketch of Figure 3, they also slant in the side view,

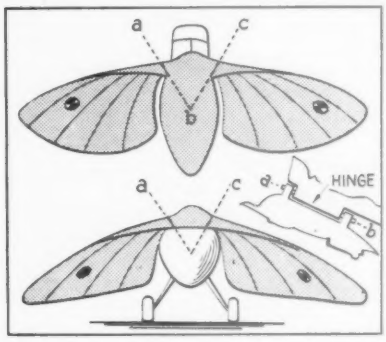

Figure 3.

at a-b, so that as the wings rise and fall on this 41° angle the center of pressure still stays in practically the same fore and aft location through a considerable range of wing flap.

If we were to maké our present planes to flap their wings and still use our present wing curves, then the simplest method possibly would be as shown in the diagram on page 40.

Here the wing is not only hinged at its root to the fuselage but is also pivoted at the point C, so that it can turn on this pivot. Below is a crank, K, driven by motor M. On the crank K is a double connecting rod D-d, running up to the wing. As the crank K turns, it not only flaps a wing up and down longitudinally, but changes its angle on the up-and-down stroke, as shown in the bottom sketches, with the crank rotating in the direction of the arrows. As the crank comes down on the right the wing angle is very much steepened for a greater angle of attack, giving down lift and back thrust.

In the mid-stroke the wing is in intermediate position, as shown also in the upper sketch but on the up-stroke, as in the right hand sketch, a greatly increased angle of attack is presented, so that in forward flight the wing on its up-stroke has considerably more angle of attack, and therefore lift, than on the down-stroke. The difference in lift is just enough to compensate for the lessened power lift as the wing comes up and the increased lift as the wing comes down.

The problem is to compromise these two angles so that the vehicle would support itself without the bouncing which results from having more lift on the down-stroke than on the up.

With the rigid wing we have shown, this would probably have to be accomplished by a spring on the (d) side of the triangular connecting rod, which would keep a constant lift on the wing at all times, whether it were on the *up*-stroke or *down*-stroke, the lifting power of the spring, of course, being constant.

A simpler way might be as in the lower sketch of Figure 4, making a wing with all of the stiff structure in and around

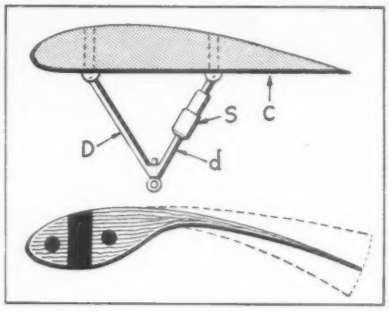

Figure 4.

the leading edge, as we did with the palm leaf fan, and having flexible ribs from there back. The flexible ribs would change angle under load, as shown by the dotted lines. This, in combination with the triangular connecting rod method, could insure constant lift and steady ride.

In these studies I have confined my examination to insect wings on account of the tremendously complicated structure of the bird wing. Up to now we cannot make a bird's wing, with a brain in every feather, even if we knew how it worked—but we can make the flat flexible planes of the insect wing as a beginning of our experiment. It is possible that we might wind up by flapping wings of our present type, but with different curves to conform with the new problem.

For small planes, at least, the flexible type would almost be necessary because of the low inertia weight which can be obtained as compared with present type thick structures, which would be too heavy to vibrate up and down even at moderate speed. END

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Mr. Sharp

(*Continued from page* 35)

British "thumbs-up" signal. I interpreted it to mean that he was going to stay with me. He was grinning broadly and, aside from the slip stream driving violently at his back, looked comfortable. When I realized that I had to land with him out there, I immediately thought of 1,000 things that could happen. Would the rudder have any effect at landing speed? Could Sharp hang on if we landed hard? Would we stall violently with that added weight and the center of gravity moved so far back?

We were flying over the airport apparently unnoticed. As soon as I saw a clear traffic pattern, I let down gently to establish a leg for a power approach. I took the longest runway, slightly crosswind, and at 1,000 feet headed into the field. In order to keep the ship straight I had to play the rudder back and forth. Every time Sharp shifted his position out there on the tail, I could feel the ship slur and lurch. I will admit, though, that he kept reasonably still.

Coming over the east boundary of the airport at approximately 50 feet, with plenty of flying speed, I gradually eased the throttle back to the halfway mark. I should estimate that our speed was

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about 20 to 25 m.p.h. above normal stalling speed. As we neared the ground, the rudder became less and less effective but by the luck of the English the wheels finally touched and we rolled along for about 200 yards with our tail up. Gradually, as we lost speed, the tail lowered and all three points gently touched the ground.

Sharp had managed to hang on through all this, and as soon as I could, I taxied over to the wind tee to let him off. Aside from a huge bump on his head he was very healthy and very, *very* happy. I glanced at my watch and only then did I realize he had been out there on the tail for about 30 minutes.

I talked to him as soon as I could get out of the ship and learned that he had not fastened his safety belt securely before take-off. When we hit that turbulent air, he was lifted from his seat and thrown by the slip stream back along the fuselage. The parachute he was wearing caught on the side of the cockpit, turning him around. His first impression of the freak mishap was a severe wallop sustained when his head hit the tail. Then he threw out both arms and grabbed the flying wires. He had dangled there for a second, then gradually drawn his legs up onto the stabilizer. As soon as he realized he was secure he brought his right leg around so that he straddled the tail of the plane.

I asked him why he didn't jump when we finally gained enough altitude to make this possible. He said that he didn't feel sure his 'chute would work, because he had given it such a violent bump on the way out of the cockpit. He also said that he was sitting slightly sideways and could not feel the pack underneath him. And he had neglected to adjust the leg straps before taking off, never dreaming, of course, that he would have occasion to use the parachute. The straps were dangling down around his knees.

After answering a thousand onlookers' queries, Cadet Sharp and I immediately got into another plane in order to go aloft again. Sharp seemed entirely unruffled by his harrowing experience, and I sent him up solo as I had previously intended. However, I took no chances. I checked his chute and safety belt carefully to see that both were securely fastened!

After our little episode, both Sharp and I appeared on several broadcasts and received numerous cables and letters from people all over the world.

But the story of the amazing Mr. Sharp doesn't end here. On January 20, not six days later, Sharp again flirted with death. His life *must* have been charmed. The second escape took place on an auxiliary air field, some five miles south of Tuscaloosa. Sharp had been shooting a solo accuracy stage and had just taxied out onto the apron to take-off. I know he must have cleared behind him for any approaching airplanes, because since his bare-back ride he had been an unbelievably meticulous student. Having determined that all was clear, Sharp looked out in front and was just about to open the throttle when a cyclone seemed to break loose over his head. Instinctively he ducked down in the cockpit just as another plane—one which had undershot the field and was dragging in below the trees out of Sharp's vision—crashed on top of him!

When a plane lands on top of another, sitting on the ground, someone is usually killed. But not in this case. Derek Sharp and his golden horseshoe cheated old Mr. Death just as he had cheated him not six days before. Even though the entire upper right hand section of the wing had been smashed and lay strewn about the runway; and even though the propeller and undercarriage of the second plane, piloted by Sidney A. Sims of Surrey, England, had missed his head by inches, Sharp remained unperturbed and fought his careening airplane to a stop. The other craft, undamaged, went around again and landed safely.

I was standing in the vicinity, watching the entire incident with amazement. The cowboy stunt of the preceding week had been unbelievable. This, so soon afterward, made me certain that Sharp was blessed with some sort of supernatural protection.

Running toward Sharp, I watched him slowly climb out of the plane and stand beside it. He surveyed the wreckage somewhat dolefully. When I finally arrived he looked at me for a long moment, shrugged, and remarked: "I wonder how long this can keep up?"

Did Pilot Officer Derek Sharp's luck last? FLYING *checked the records of the British Air Ministry and received the letter reproduced below.*

Sloane 3467.
TELEPHONE NO. ~~[illegible]~~
TRUNK CALLS AND TELEGRAPHIC ADDRESS "AIR MINISTRY LONDON"

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~~LONDON, W.1.~~
2, Seville Street,
Knightsbridge,
London, S.W.1.

P.405692/S.14 Cas.B.2.

10th September, 1948.

Sir,

I am directed to refer to your cable of recent date and to say, with regret, that Pilot Officer Derek Minden Sharp, (145476) R.A.F.V.R., was the Captain of a Lancaster aircraft which failed to return from a bombing attack on Gelsenkirchen during the night of 25th/26th June, 1943.

No information with regard to the aircraft or any member of its crew has been received since they were reported missing, and the death of Pilot Officer Sharp has been presumed, for official purposes, to have occurred on 26th June, 1943.

I am, Sir,
Your obedient Servant,

Curtis Fuller, Esq.,
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The U.S. Is My Territory

(*Continued from page 26*)

In landing at out of the way places I don't have much trouble with ground transportation. At large cities I land at the big airline terminals and use regular terminal facilities to get into town. At smaller cities the people I'm coming to see usually find it takes only a very few minutes to drive out and pick me up.

Suppose my business takes me in to Lawrenceville, Ill., which is 255 miles by air from the airport at Waukegan where I hangar the plane. It is impossible to reach Lawrenceville by commercial airline. Suppose I try to go by train. The only practical way to go is to take a train out of Chicago (an hour from Waukegan) at 4:15 p.m. to Vincennes, Ind. I arrive at Vincennes at 8:15 p.m. The earliest train to Lawrenceville leaves at 4:05 a.m. By the time I get to Lawrenceville I have been up all night and have killed another four hours or so waiting for the man I came to see. Then I have just as hard a time getting back to Libertyville and I've spent a day and a half or two days.

Actually, it is so complicated getting to Lawrenceville by any public transportation that I can almost fly the distance in the time it takes me to figure out how to get there by train or bus. The other day I took off for Lawrenceville at 6:40 a.m., flew 2.3 hours, and was there by 9 a.m. I was through with my business at 10:10 a.m. and was back at the Waukegan airport at 12:30 p.m. I had covered 510 air miles and still could put in a full half day's work at the office.

Or suppose I want to go to a city that is already fairly well served by airline and train. Recently I flew to Columbus, O., which is 330 air miles from the airport at Waukegan. I left at 6 a.m. and arrived in Columbus at 8:50 a.m. I transacted my business and left Columbus at 3:45 p.m., was back home at 7 p.m. I had covered 660 air miles in 5.9 hours of flying and still had spent virtually a full day in Columbus.

I could not have done this even by airline. The only practical flight leaves Chicago at 7 a.m. and I have to change planes at Dayton. Considering the airline flying time, plus the two hours it takes me to get to Chicago Municipal Airport to use the airline, and I've lost at least an hour besides being subject to all the bother of getting reservations, taking my chances on cancellations, and so on.

As another example, on August 19 we had an important demonstration at Lorain, O., at 10 a.m. Eastern Daylight Time. I left home at 5 a.m. Central Daylight Time and arrived in plenty of time for the demonstration. After the demonstration and a leisurely lunch I left for home and was actually back at my desk in the office at 4:30 p.m. Central Daylight Time, to sign letters typed in my absence and which should have gone out that day. Now a look at the figures—680 air miles in 5.9 hours, average speed 115 m.p.h. I used 55.6 gallons of gasoline at a cost of $17.95 and one quart of oil at 38 cents. Total cost of $18.33. This represents a fuel cost of only .026 cents per mile.

Yes, I find that my own flying is more dependable than airline transportation. The only occasion in which I really lost time because of weather delay in the past 18 months came last January, and then it didn't amount to much. I left Waukegan Airport early on the morning of January 21, flew to Minneapolis, refueled, and went on to Fargo, N. D., and thence to Bismarck, intending to get through, when I ran into an unpredicted front. I got almost as far as Miles City, then turned back and landed at Dickinson, N. D. I stayed here overnight, took off at 8:50 a.m. and arrived at Billings at noon. I phoned Billings to let them know I would be a little late. They changed the program for my meeting to allow me time in the afternoon session.

On another occasion I was grounded at New Haven, Conn., on a Friday noon but since I was only an hour from New York I went in on the train and kept my appointment.

Weather could have grounded me more often if I hadn't kept my schedule so flexible. If I know there's a front between Libertyville and Minneapolis, I fly to St. Louis instead and call on our distributor there. Recently I cleared out of Sunbury to Philadelphia, but when weather got in the way I flew to Harrisburg instead and called on our distributor there, flying to Philly the next morning to keep my appointment.

At times I fly quite high to get over the weather or around it. I never fly on top unless my destination is clear. Not long ago I was flying from Spokane to Seattle. Although I had plenty of fuel I landed at Ellensburg to gas up again. Stampede Pass was closed, but Seattle had high, thin, broken clouds with good visibility. So I went over the top and let down in Seattle under very nice conditions.

I don't take chances. I always check the weather carefully and I always preflight the plane, too. In my file is a thick sheaf of flight reports giving detailed information on every single flight between each point since we purchased the plane. This report gives place and time of takeoff and landing, mileage, trip average, gasoline and oil consumption, storage details, repairs if any, and remarks, such as winds aloft, ground speed, log of special radio contacts and so forth.

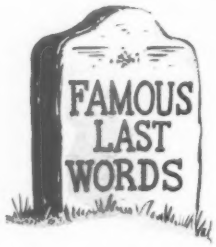
These reports show that though I have received pretty bad service at a few airports, generally I've been exceptionally well treated. At some places, like St. Augustine Beach, we've not only been treated courteously but have been given lists of hotels with their price ranges, recreational facilities, and have been aided in other ways.

My Stinson is equipped with two-way radio plus a stand-by receiver, sensitive altimeter, rate of climb, turn and bank, and a clock. When radio reception is very poor I use headphones and a single jack, plugging from one receiver to the other. When it is very good, the speaker comes through well enough.

One reason to keep careful cost records is to check oil and gas consumption to see whether either is going up. Our Stinson has proved very economical to operate and 100-hour checks cost only about $46 to $52. I like its simplified construction. The gear hanging down costs speed but it's good and solid and I don't have to spend any money on it. The plane is comfortable, trims nicely, and is reasonably quiet. I like its gravity fuel flow and the fact that the flaps are hand-actuated.

Early in August my wife and two children flew with me for a brief vacation to St. Augustine Beach, Fla. We brought back my sister-in-law. Our weight was such that in addition to the five passengers, we could carry 178 pounds of baggage. The total cost of gas and oil and storage for the 2,038-mile trip was only $65.40, or 3.2 cents per mile. We had an average ground speed of 111 m.p.h.

Besides its general all-around utility, our plane has proved extremely valuable on special occasions. The other day two clients from Cape Town, South Africa, dropped into our plant unexpectedly. They didn't know much about our equipment, and we bundled them into the Stinson and flew up to Wisconsin where we knew some of our machinery was oper-



(From Information Bulletin of the 11th Air Force)

"That's my home field. I can get in."

"Only scattered thunderstorms. Let's go."

"Two hundred feet. Hell. It'll be 1500 by the time we get there."

"It's okay. I've been flying over that area for two years."

"I can make it. Just lean it all the way back."

"Let's go look and make a 180 if it isn't okay."

"It's over in that direction somewhere."

"Only JB's go around."

"All I gotta do is fly half contact and half instruments."

"What did he say the altimeter setting was?"

"Damn the check list. Let's go."

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Pilot Robert P. Lamont
AOPA Member Pilot No. 19868

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ating on just the kind of job they wanted it for. Both plane and equipment made quite an impression, I'm happy to say.

Not long ago, in Cleveland, one of the distributor's salesmen said he wished I could go down with him to a small town in Ohio where a customer was considering our equipment but hadn't quite made up his mind. The salesmen had important appointments in the afternoon and couldn't spend much time traveling. We flew down there in a short time, sold the machine, and were back in time for his afternoon appointments.

With scores of similar performance records, is it any wonder I'm sold on personal planes for business transportation? As far as I'm concerned, they pay off in time, money and prestige. Our plane not only gives us all these benefits but it is the only way we could do our job.

I believe the successful use of a plane in our business is due to the choice of the right plane for our particular needs, the vastly improved reliability of postwar aircraft equipment and aircraft service, the post-war improvement in ground transportation, more reliable and better coverage of CAA range station navigational facilities and weather forecasting, and last but not least, the use of good judgment in trip planning. END

Deer Hunting

(*Continued from page* 38)

of tourist and hunter resorts can be obtained by writing to Jack Boyle, secretary of the Marinette County Outdoor Recreational Association in the city of Marinette. Boyle is in constant touch with resort operators and guide services and can usually give tourists the recreational information they need. Rates for cabins run from $12 to about $25 per week.

Pilots flying into the region from the south (Marinette County is 230 miles north of Chicago) will probably land first at Oconto Municipal Airport, about seven miles south of the Marinette County line. Robert L. Jubin, airport manager, says he will arrange transportation and show hunters "where to go for best results." There's no tiedown fee at Oconto, and hotels in the town have rates from $2.50 up. Jubin recommends the Parker House hotel. Cabs to town (two miles) cost 50 cents.

Should you prefer to land farther north, both Crivitz and Menominee (Mich.) airports are convenient to the region's southern portion.

Crivitz is perhaps nearer to the best deer hunting but Menominee, directly across the Menominee River from the town of Marinette, is closer to urban facilities.

Charles Glanzer, owner and operator of the Crivitz field, is considered an authority on the central part of Marinette County and can be relied upon for up-to-date hunting information. Hunters can probably secure non-resident deer licenses right at the Crivitz airport; if not, they can be purchased at local ranger stations. Glanzer's airport restaurant, incidentally, is noted for its tasty chicken dinners. The field is not shown on the current Green Bay sectional but will appear in the next issue. There is no tiedown fee.

The Menominee airport's assistant-manager, Leonard C. Ward, says he can give flyers special information on deer-hunting, with assistance from Chambers of Commerce in Menominee and Marinette. Ward recommends the Menominee Hotel in Menominee, which has rates beginning at $2 per night. There is no tiedown fee, and taxi to town is 35 cents.

A little farther north, and about 16 miles west of the county line, is Laona airport and at the north end of the county are two other fields—Loretto and Northland, both located in Michigan just a mile or so outside Marinette County. Loretto is not maintained but is usable.

Operator Bourdlaies at Northland Airport says he is "familiar with hunting in the county and will assist in finding guides and in making reservations." There is no tiedown fee at Northland, and Bourdlaies suggests that hunters stay at either the Kimlark Inn at Niagara, Wis., or the Norway Hotel in Norway, Mich. Rates at the two hotels begin at $1.75.

"We'll locate lodgings, guides and help the hunters all we can," promises Bourdlaies. "Kimlark Inn is a fine, 34-room building and the town is surrounded by good hunting grounds. There also are a number of tourist cabins at Norway,

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Crivitz Municipal (45°13'-88°05')	19R11	Crivitz, Wis. 4 mi.	Two	2,600 ft.	80 oct.		Charles Glanzer, Airport Manager, Crivitz Airport, Crivitz, Wis.
Northland (45°48'-87°57')	5898	Norway, Mich. 2½ mi.	Two	3,350 ft.	80-91 oct.	Repairs	Walter J. Bourdlaies, Owner and Manager, Northland Airport, Norway, Mich.
Menominee Airport (45°7'-87°40')	4664	Menominee, Mich. 2 mi.	Three	5,200 ft.	80-91 oct.	A & E mechanic	Leonard C. Ward, Assistant Manager, Menominee Airport, Menominee, Mich.
Oconto Municipal (44°53'-87°55')	922-F6	Oconto, Wis. 2 mi.	Two	3,500 ft.	80 oct.	Major repairs	Robert L. Jubin, Manager, Oconto Airport, Oconto, Wis.
Laona Airport (45°32'-88°46')		Laona, Wis. 3.7 mi.	Three	2,300 ft.	80 oct.		Harold Irish, Airport Manager, Laona, Wis.
Loretto Airport (45°45'-87°48')		Loretto, Mich. 2.4 mi.	Two	2,100 ft.		(Field is usable but not maintained)	

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just across the Menominee River." Northland Airport is actually located at Quinnesec, a small village, but Norway has better facilities.

Bourdlaies also suggests that flyers interested in fishing and sightseeing will enjoy themselves in the region. He says an interesting side trip can be made to Pine Mountain ski slide, the highest artificial slide in the world.

"The close of the hunting season brings the 'Hunters' Balls'—quite an occasion," the Northland operator says. "Most persons attend the balls in togs, dancing in boots and plaids. Prizes are given at various places for the largest buck, which must be officially weighed. The balls draw large crowds and are sponsored by local sportsmen's clubs, with everybody invited."

Before flying into the region for hunting, pilots should familiarize themselves with the Wisconsin Hunting Regulations, which can be obtained by writing to the State Conservation Commission, State Office Building, at Madison. In particular, hunters should remember that it is illegal to use an airplane for hunting, spotting, rallying or driving deer.

Non-resident hunting (including deer) licenses cost $50. Non-resident archery licenses (for deer only) cost $5.

Jack Boyle of the Marinette County Outdoor Recreational Association says the following citizens should be able to advise hunters in their section of the county:

At Pound, Art Woulf, a garageman who has late information on the Pound-Coleman region; at Athelstane, Sheldon Schaf, a tavern-owner; at Goodman, George D'Amour, office manager of the Goodman Lumber Company; at Wausaukee, Elmer Dahl, in charge of the Ranger Station; at McAllister, Earl Reitmeyer, owner of Hunter's Inn; at Peshtigo, Jack Scowland, a contractor; at Pembine, E. G. Sauld, a former state senator; and at Amberg, State Senator Phil Downing.

The Green Bay (W-7) sectional covers Marinette County and vicinity.

Because the Wisconsin deer hunting season attracts thousands of hunters, it's a good idea to write early for accommodations and to have fairly complete information before flying into the state on a hunting expedition. With a minimum of prior planning, however, the deer hunter should be well-repaid in venison and thrills for a flight to Marinette County in November.—CHARLES L. BLACK.

Piper Family Cruiser

(*Continued from page 31*)

pushes the folded seat back into the upright position, snapping the catch in place. Only then can the other person lower himself onto the seat and fasten his belt.

These gymnastics can or cannot prove embarrassing to a woman passenger, depending on the length of dresses currently in vogue at the time of her flight. Practically speaking, though, she'd better wear slacks.

The back seat is easily reached and, though it could stand a bit more width, is fairly comfortable. The back of that seat unhooks and falls forward, uncovering the baggage compartment—an arrangement like that in the small Cessnas.

As I've already pointed out, the airplane I flew for this article (N-5149H) was equipped with a two-position propeller, a Sensenich *Sky Blade*. So there was an additional knob to work on the instrument panel. But it is used in very much the same manner as are all controllable propellers: you leave it in low pitch for warmup, taxiing and take-off, and use high pitch for cruising. The mechanism is operated by one knob on the instrument panel which is pushed forward for low pitch and pulled out for high.

The master switch and starter are in a new position for personal planes. Both are mounted in a unit on the cabin floor up against the right front seat. The starter button is in a recessed hole and cannot be operated unless you stick a finger into the hole. There are dual stick controls; the right set of rudder pedals does not have toe brakes.

The trim tab is operated by the familiar Piper crank handle on the left wall of the cabin. On this airplane I got the impression that it takes too many turns to get the amount of tab desired. The excessive cranking is bothersome in the standard airplane, but in the airplane I flew—which was equipped with radio headphones and a mike, both of which plug into a small panel right in front of the tab handle—it gave me considerable trouble. Having to crank several turns during a landing or take-off, I constantly found myself winding the mike and headphone cords around my left arm tighter and tighter with each turn. Only solution was to let go of the stick and hold the cords out of the way while I cranked, letting the airplane fly itself.

The *Family Cruiser* taxies as easily as the *Super Cruiser* and *Cub*. Visibility on the ground is good and the steerable tail wheel and brakes are quite effective. Take-off procedure is quite simple: see that the fuel-tank valve on the left side of the cabin is properly set, adjust the trim tab for whatever load you happen to be carrying, shove the throttle full forward, and the rest is like any other *Cub*. With the controllable prop, though, the accepted procedure is to pull it back to cruising pitch as soon as the ship leaves the ground. That's probably to avoid overrevving the engine as the plane picks up speed.

PIPER FAMILY CRUISER
CAA Type Certificate No. 797
One air-cooled 115-h.p. Lycoming engine

Wing span	35 ft. 5½ in.
Length	23 ft. 2½ in.
Height	6 ft. 5 in.
Gross weight (normal category)	1,850 pounds
Gross weight (utility category)	1,550 pounds
Empty weight	1,000 pounds
Wing loading	10.3 lbs. sq. ft.
Fuel capacity	35 gals.
Maximum baggage	80 pounds
Maximum speed	123 m.p.h.
Cruising speed	110 m.p.h.
Stalling speed	46 m.p.h.
Range	500 miles
Service ceiling	10,500 feet
Rate of climb	575 f.p.m.

Source: Piper Aircraft Corp., Lock Haven, Pa.

Best climbing air speed is about 65 m.p.h. indicated. I made a number of climbs from take-off, and the rate ranged from 550 to 600 f.p.m. I even tried leaving the prop set in low pitch, as you normally should do on take-off, but the engine turned up so fast I had to throttle back. Result was a poorer rate of climb than I got when I pulled the prop back immediately after the wheels left the ground.

This is the first Piper airplane that has stick forces so high you almost have to use the trim tab for any prolonged change of attitude. I found it necessary to use tab all the time, during landings, take-offs and flight. But when you do use the tab and controls properly—and you can catch on easily—the *Family Cruiser* proves to be a comfortable and stable airplane to fly.

There's nothing startling about this airplane in the air. It's easy to fly, fairly comfortable (though cramped), and stable. It maneuvers well despite the high stick forces, and has excellent stall characteristics. I stalled it several times, flaps down and up. It indicates about 45 m.p.h. at the stall, with not much noticeable difference between flaps-down and flaps-up. I was able to maintain altitude comfortably at 40 m.p.h. indicated and using 1,700 r.p.m.

Most pronounced difference between this and any other Piper airplane is its landing characteristics. The large drag flap is very effective and makes it quite easy to get into small fields without too much of the old super-skill in a glide. In this respect the *Family Cruiser* has some of the best qualities of the *Navion*, which I think is one of the world's finest airplanes at low speeds. The Piper airplane is simply trimmed full tail down, full flap is dropped, then the approach made from an altitude a little higher than required for a normal glide. The pilot can even "milk" the flaps as he glides in, depending on how his glide estimate works out.

With full flap, the glide is quite steep. Hence forward visibility is excellent. You simply aim the airplane at the spot on which you plan to land, then just let it slide on down. Indicated air speed in a full-flap power-off glide is about 65. One thing is noticeable with full flap: there is a constant, though slight, turbulence over the tail, but it doesn't affect the plane's performance so far as I could find.

The flap comes in quite handy in take-offs with a load. There are three flap positions. The first should be used for take-offs from a rough field, with the flap already in position before the take-off is started. For a take-off from a small smooth field, the technique is to get the plane rolling to an indicated speed of 40 m.p.h., then pull the flap down to its first notch. The plane hops right out and climbs.

In other words, the *Family Cruiser's* flap is one of the best features on the plane. I have only one objection to it: the flap handle, which is between the two

front seats and is pulled upward and back by the pilot, jams up uncomfortably against the pilot's right leg in the full-flap position.

Piper claims a cruising speed of 110 m.p.h. I cruised it at 2,450 r.p.m. and got about 105. A friend of mine flew one to Florida and back and computed his average ground speed for the round trip at 98 m.p.h. Fuel consumption (he used the mixture control liberally) averaged 6.7 gallons per hour.

Visibility in the air is good for a conventional high-wing monoplane. The nose sits well down in level flight and it's possible for a tall man to see out the side windows without getting down on his knees.

The noise level is about standard for this combination of engine, windows-all-around, and routine soundproofing. It's noisier than an airplane should be ideally, but it's also a good deal quieter than a number of current personal planes. You are bound to have a noisy airplane with an engine that must be cruised at 2,450 r.p.m.; you can imagine what it sounds like at 2,800 r.p.m. where you get the full 115 h.p.

Ventilation of the *Family Cruiser* is fair. There's a sliding window on the pilot's side. The large single door is on the right side but no window opens on that side of the airplane. There is a hole in the firewall near the floor, just in front of the right front seat. A flexible hose feeds a blast of air into the cabin through that hole—another reason Mabel had better wear slacks.

My overall impression of this airplane is that it's the same old *Cub*, with hair on its chest. While that means that it's undoubtedly less efficient than more modern designs might be, it also should be about as simple and trouble-free an airplane as you'll find. Besides, this airplane has a better-than-average ratio between its stalling and cruising speeds—2.28 to 1.

In other words, this might well be your best buy, if you're looking for a four-placer for as low an original price* as possible. END

Mighty Midgets

(*Continued from page* 24)

lapped a plane on a turn, and the pilot, thinking Fish was going to cut inside him, pulled out wide. But Fish had elected to go wide too, and he carried Fish still wider. As they entered the far stretch it was evident that Wittman had gained. If he could gain as much on the final turns it would be anybody's race. They came around the last pylon and roared into the stretch. Salmon was still leading. As they tore across the finish line there was a scant 100 yards between them—pretty close for a 30-mile race. Art Chester was close behind at third, Bill Brennand was fourth and Billie Robinson fifth. The first five planes across the line all beat Brennand's winning time of last year—165.857 m.p.h. Salmon's winning time was 169.608—and that's a measure of how close the winning planes were matched. The little planes had spun 15 laps around a two-

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mile course at the fantastically high average speed of 165 to 170 m.p.h.—and on only 85 h.p. Less than eight seconds in time separated the first four.

Probably the most disappointed man in the race was Art Chester. His first *Swee' Pea* flown by Paul Penrose placed second last year. His new *Swee' Pea* had the fastest time in the qualifying trials and Chester had expected to win on a basis of its performance. Nevertheless, he was not gaining on either Wittman or Salmon at the end. In the final analysis, the deciding margin was the start. Salmon had the best take-off and actually was never headed. Chester had a poor take-off. Though he recovered a lot of his lost time he really had lost the race before he got off the ground. Wittman, who placed second, was gaining a fraction on Salmon but it would have taken at least several more laps to catch him.

The prop wash of the 10 finalists added to the already rough air to make it a tough race to fly. Both Salmon and Chester had bettered the winning time in their elimination heats. Both Brennand and Wittman also flew faster in their elimination heats than in the final race.

Salmon was top money winner with $7,320. He was followed by Wittman, $4,320; Chester, $2,405; Brennand, $1,420; Robinson, $1,105; LeFevers, $1,090, and so on down to Ray Baker of Independence, Mo., who won $50.

The Goodyear Trophy Race, more than any other event of the National Air Races, has excited the interest of lightplane pilots. The high speed performance of the little racers is a goal toward which every lightplane pilot wistfully yearns. One of the original purposes of the race was to encourage the design of lightplanes, according to P. W. Litchfield, Goodyear Board Chairman.

It seems doubtful that there will be much gain from that direction, however. The little craft are strong—they must weigh at least 500 pounds and meet rigid strength specifications. But they also land faster than the average private pilot would care to, hold only one person, and are terribly cramped to reduce frontal area. Wing areas must be at least 66 square feet, which isn't much compared with 178.5 for a Piper *Cub*.

Goodyear Tire and Rubber Company sent out more than 300 sets of specifications for building the racers in the past year. Construction was actually begun on more than 100 of the little planes. Thirty-seven entered the competition and 22 started in the elimination heats.

Strength specifications are rigid. Engines must not exceed 190 cubic inch displacement. Minimum weight must be at least 500 pounds to insure solid construction. Landing gear must be non-retractable, propellers must be fixed pitch. There are many other regulations governing noseover structure, fuel tanks, parachutes, materials and workmanship, general design, test requirements, and pilot qualifications. Original designs included flying wings, prone pilot models, and planes to which jet propulsion might be added later. Only reasonably orthodox models were actually among the winners, however. END

Aerocar

(Continued from page 34)

mobile need weigh only 1,600-1,700 pounds (*Aerocar's* gross flying weight is calculated at 1,640 pounds). For this, a 100 h.p. motor is ample, and 100 is not too much for an automobile.

Aerocar is designed for an aircooled four-cylinder Franklin 225 engine, developing 100-115 h.p. A conventional automobile spark retarding system will permit idling at speeds as slow as 300 r.p.m., which is necessary for low road speeds. Fuel injection will be used to eliminate icing problems in the carburetor. There will be a composite ignition system with one magneto and one distributor. A torsional vibration damper, flywheel and cable belt drive are expected to give a smooth flow of power.

In flight, the engine is coupled by direct drive and universal joints to a rear propeller. On the highway, the engine connects with four cable V-belts to the clutch. There is a conventional three-speed transmission with reverse gear.

Driver and passenger sit well forward.

AEROCAR'S PROJECTED PERFORMANCE

(Based on wind-tunnel tests at the University of Washington)

Top speed	109 m.p.h.
Cruising speed	Over 100 m.p.h.
Rate of climb (first minute, full load)	Over 500 f.p.m.
Service ceiling (full gross weight)	12,000 feet
Cruising range	Over 300 miles
Landing speed (with flaps)	53 m.p.h.
Landing run (with normal braking)	300 feet
Take-off (full gross weight, sea level)	655 feet
Distance to clear 50-foot obstacle (full gross weight)	1,225 feet
Taxi turning radius	30 feet
Road turning radius	15 feet
Designed road speed (engine red line)	60 m.p.h.
Road range	Over 500 miles
Fuel consumption (cruising)	Approx. 7 gal. per hour
Time to change from plane to car	One minute

The engine is aft of them but ahead of the rear wheels. In flight, the center of gravity is slightly forward of the rear wheels. On the highway, the center is midway between the front axle and the rear axle. As a result, *Aerocar* has front-wheel drive, with differential and front-wheel unit similar to the Jeep. This permits landing the aircraft on the "free" rear wheels.

In conversion from automobile to plane, the wing hinges on the rear spar, swinging aft alongside the tail. The front spar fitting of each wing fits into the automobile body aft of the driver's head. Two and a half feet farther back on the car, the longerons extend into the automobile. These four fittings are then locked by pins inserted simultaneously.

The locking device is operated by a crank similar to that used to roll down the windows of an automobile. The lock-

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ing operation is entirely within view of the driver and thus permits a visual check and assures confidence that the assembly is firm and complete. Flaps and ailerons automatically extend into flying position as the wings swing forward, and supporting lift struts are coupled automatically.

Several design features are expected to increase stability in flight. In the tail, a butterfly (20° angle above the horizontal) prevents the two blades of the rear propeller from intersecting the tail wash simultaneously. The butterfly also increases lateral stability.

Tail fin and rudder are placed below the elevators to provide directional control even in stalls. In *Aerocar*, the fin will be out of the turbulence and in the slipstream all the time. Wind-tunnel tests show that the plane retains directional stability at all times.

The two trailer wheels are left partially exposed on the leading edge. This controls the stall pattern of the wing. The result is similar to that gained by a purposely bad spoilage strip (as on *Ercoupe*), and there is complete aileron control through a stall.

Aerocar engineers have worked closely with the CAA, supplying results of the wind-tunnel tests and checking on special problems (structural and operational). A typical problem grew out of the use of a four-wheel landing gear—a type outside regulations written in terms of the conventional tricycle landing gear.

Aerocar's design reflects advance engineering by a number of aircraft manufacturers and suppliers. Bell, for example, provided assembly drawings for information on the cooling fan and Lockheed for data on the tail propeller extension shaft drive. Delco products division of General Motors assisted with ride-control on the front wheels and Gabriel Manufacturing did the same for rear wheels. Consolidated Vultee and Borg Warner also supplied technical information.

Taylor manufactured aircraft radios at Long Beach, Calif., before the war. During the war he was officer in charge of guided missiles and pilotless aircraft development at the Naval Aircraft Modification Unit, Johnsville, Pa., and held the rank of Commander, U.S.N.R. He flew the first jet-propelled guided missiles for the Navy.

Ready for road, Aerocar's tail and wings will be folded behind, forming a trailer.

Associated with Taylor are C. H Kitchell, formerly chief project engineer at Taylorcraft Aviation Corp.; Arthur Robertson, former stress engineer with Lockheed, and Robert Martin, former project engineer at Air Cooled Motors.

Production of *Aerocar* is dependent on tests with the first full-scale model. Present plans call for manufacture at Longview, Wash. END

I Learned About . . .

(*Continued from page* 44)

Instead of getting more altitude, I made still another error: I came down to 500 feet from where I could see even less. But I flew on. Mistrusting my compass, I changed course. Then I saw a beacon in the distance. My spirits rose a little and I flew toward the light, dropping to 200 feet and circling it. On the side of the beacon were painted a big number "5" and an arrow. I didn't know what the marker meant but thought perhaps the arrow was pointing north.

I flew toward what I thought was east, but knew I'd have to land somewhere very quickly if I didn't want to be killed. I kept looking around trying to find a spot, any kind of spot.

"Just let me get out of this," I kept promising myself, "and they can have their cross-country flying."

Peering through the blackness, I finally spotted what looked like a field. Although I had plenty of gas left I was so frightened and worried that I just couldn't keep on. I came down for a landing and just prayed. There was no way to tell wind direction, and as I came in I saw dark portions of the field that I thought were trees. I made a wobbly turn, picked out what I thought was the clearest part of the field and leveled off. It wasn't much of a landing; the plane bounced and bounced, but at least I was on the ground. When I climbed out of the plane, I saw that my prop was smack up against a hedge.

Oddly enough, my first thought was of the damage I had done to whatever crops were in the field. And when a couple of farmers came out, holding lanterns and staring at me as though I were crazy, I stared back at them and quavered, "I hope I haven't spoiled a valuable crop!"

"Crop?" they echoed. "You came down in a field full of rocks. Why didn't you land over there in the alfalfa?"

The alfalfa was the dark portion of the field I had tried so hard to avoid.

Then they asked me where I was from.

"Los Angeles," I said, innocently. If I had said "from Mars" I couldn't have perplexed them more. It was a Pennsylvania Dutch section, somewhere near Gradyville.

When we drove out to the rock and alfalfa field the next day, we found the plane miraculously intact. I stood there, looking at the Waco, thinking of all the errors I had made: my failure to change my watch, my almost fatal distrust of my compass, dropping down to 500 feet instead of going up to about 3,000 where I could have picked up the lights of Philadelphia without difficulty and, furthermore, taking off from Harrisburg without checking what was ahead. If I had asked a few questions I could have discovered that the arrow I saw on that beacon was not pointing north but toward Philadelphia, and that the big number "5" I had seen on the beacon meant that four beacons beyond was my destination.

But I didn't know. I had to learn about cross-country flying the hard way. At least I managed to survive and fly once more but I don't think I'll ever again forget to move my watch ahead —not when I'm flying, anyway. END

Air Force

(*Continued from page* 19)

In addition cadets get a $1 per day subsistence allowance. The Government will also underwrite for you a $10,000 life insurance policy while you are in training. You can continue this policy after graduation by taking over the nominal payments.

After two weeks of processing and indoctrination at your basic flying school you get 20 to 25 hours of dual instruction in the North American T-6. This rugged plane is still used by several small countries as a combat fighter. After about eight weeks of instruction in take-offs and landings, aerobatics and basic air work you will solo. Then comes instruction in formation, instrument and night flying. When you finish your basic course you will have logged about 170 hours of solo.

Basic training, however, is not all flying. Three hours a day are spent in the classroom where ground instructors teach the theories and techniques of flight which the flight instructors demonstrate in the air. Aircraft engineering, weather, navigation, aerodynamics, radio communications and aircraft maintenance are some of the subjects included in the ground school curriculum. It is well to remember that failing grades in ground school can "wash out" a cadet.

Calisthenics and off-duty sports are required and encouraged. Cadets study Air Force administration and other military subjects to prepare them for the duties and responsibilities of an Air Force officer.

When you've completed your time in the T-6 you are sent to a new base for advanced training. You may go to the single-engine school at Williams Air Force Base in Arizona or the multi-engine school at Barksdale Air Force Base in Louisiana. It depends upon your aptitude, the recommendations of your basic training instructors, and Air Force requirements.

If you go to Williams you will fly the war-famous North American *Mustang*. And, if you're at the top of your class, you will have a chance to fly the jet-propelled *Shooting Star*. A two-place trainer version of the F-80, the TF-80C, is used for cadet transition training. If you go to Barksdale you will also fly tactical-type aircraft, such as the B-25. At both schools you will fly day and night navigation missions. Advanced instrument flying and information tactics will be perfected and high altitude flying introduced.

Then, about one year and 275 flying hours after your first hop in the T-6, you will be graduated as a second lieutenant in the Air Force Reserve and will start a three-year tour of active duty. When you get your wings you receive a $250 uniform allowance and your pay, including allowances, jumps to about $336 a month and to $372 if you get married. When you complete your three-year continuous tour as a reserve officer you receive a promotion to first lieutenant.

During your tour of active duty you may apply for advanced administrative or technical instruction at an Air Force school. You will get enough flying time to enable you to qualify for a CAA commercial pilot rating. Top members of each cadet graduating class are offered regular Air Force commissions; other graduates who have completed two years of college can compete for regular commissions during their tour of duty. END

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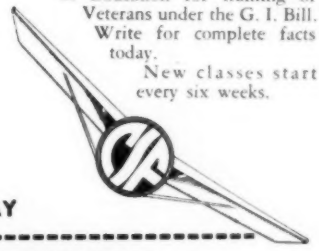

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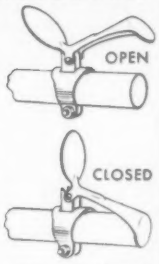

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Navy

(Continued from page 18)

which they serve on duty as fleet pilots. Whatever course you take, you will be an accomplished pilot, familiar with all types of Navy planes and expert in your specialty.

But how do you get into the Naval Aviation Cadet Program?

First of all, to be eligible, you must be a native-born male citizen of the United States, or naturalized for a period of at least 10 years.

You must be between 18 and 25 years old at the time of your enlistment. Education is highly important. The Navy requires that you shall have satisfactorily completed a minimum of two full academic years (60 semester hours or 90 quarter hours) of passing work at an accredited college or university. If you expect to complete these minimum educational requirements during the current semester, you may enlist during the semester but you will not be ordered to active duty until the end of the term.

You must be unmarried and agree to remain unmarried until commissioned, which will normally be from 18 to 20 months from the date you enlist in the Naval Reserve. You must be physically qualified and aeronautically adapted for the actual control of aircraft, and further, must obtain minimum acceptable grades on the aviation aptitude tests. Last, but not least, you must be strongly motivated to fly and possess potential officer-like qualities.

If you feel that you are qualified in accordance with the foregoing, your next step is to apply for enlistment at the nearest officer of Naval Officer Procurement. Offices of Naval Officer Procurement are located in the following key cities: Atlanta, Boston, Chicago, Cincinnati, Dallas, Denver, Detroit, Kansas City, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, and Washington, D. C.

If none of these are near you, visit your nearest United States Navy recruiting station. There you will be given the necessary instructions and application blanks. After you have complied with the instructions issued by the recruiting station, your travel expenses to the nearest Office of Naval Officer Procurement you will be paid by the Government. At the Office of Naval Officer Procurement you will be given the aviation aptitude tests, flight physical examination, and two officer interviews. The purpose of these interviews is to assist in eliminating those who will obviously have little chance of becoming good Naval officers, dependable shipmates or acceptable members of a combat team.

If you are found qualified, you will be enlisted as a Naval Aviation Cadet, Class V-5 in the United States Naval Reserve and ordered home to await orders to active duty. You will be permitted to indicate your desired date of entry into flight training and, insofar as possible, your choice will be honored.

The Navy does not have a flight training program open to high school graduates. Although the exigencies of the last war proved conclusively that boys at the high school level could be successfully developed into top-notch military pilots, the Navy feels that a more complete educational background is of paramount importance to the individual.

High school graduates seriously interested in Military Aviation as a career should bear in mind that the V-5 Naval Aviation Cadet Program is a continuing program, and the Navy strongly urges that they prepare themselves educationally so they may take advantage of its opportunities at some future date. END

The Mail Box

(Continued from page 8)

sociates often ask me: "Are we going to fight Russia?" My answer is no! And I spent two and a half years in the Russian civil war (1918-1921) fighting on the "white" side. That's why I'm here.

Let's play the chess game suggested in your article.

Much as I hate it, suppose I'm "RED." Your problem is to destroy the Reds' vital industrial areas.

To accomplish the task, the U.S. must establish bases and airfields closer to Russia, as your article said. These bases would be more *concentrated* than Russian industrial areas, would be much *closer* to Russia, and would have much *longer supply lines.* Location of bases would be well known to Russia. Lots of so-called Americans are Judases. It would be much simpler for Russia to bomb and destroy U.S. bases than for the U.S. to destroy Russian industrial areas.

. . . I know the Russian people. Stalin, his cohorts and the late Russian Tzar are not representative Russians. (I know Stalin personally, and knew the Russian Tzar as I am married to the daughter of his Secretary of War.)

The Russian people are not aggressive. They fight only if they are attacked and

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to protect what belongs to them. Russians love the American people (for example, the oft-heard remark, "If it is made in the U.S., it must be good"). Russians can do almost anything; but you can never force a Russian to do something he doesn't want to do . . .

Don't blame Russia for giving Germany the Third-Degree. If we help Germany now, we'll fight another war with the Huns in another 25 years. *But we won't fight Russia.*

BASIL J. YANCHENKO
Severn Engineering
Syracuse, N. Y.

● Consulting Engineer Basil Yanchenko, ex-captain in the White Russian Air Force, came to the U.S. in 1923. A graduate of the Imperial Mechanical Engineering College in Moscow, he invented the cost-computing gasoline pump. He was a CAP pilot during the war.—ED.

HOW MANY CUBS?

On page 8 (September FLYING) you say: "Piper Aircraft Corporation has retired its three-year $600,000,000 RFC loan in less than six months."

Six hundred million dollars would buy a lot of Cubs!

LEONARD C. TODD
Long Beach, Calif.

● Reader Todd spotted a $599,400,000 error. Veteran Manufacturer Bill Piper retired his $600,000 RFC loan in less than six months, would probably have taken longer to repay $600,000,000.—ED.

WANTS 'EM MODERN

Your excellent magazine is getting better all the time. But I have one criticism:

Your "I Learned About Flying from That" articles are well-written and interesting, but in most cases they are not topical and up-to-date . . . I for one am not interested in an incident which occurred five years ago in a heavy, twin-engine military aircraft . . .

Give us material that is directly related to problems that may arise in modern civilian flying in modern civilian aircraft . . .

LOUIS H. PRINCE
Seattle, Wash.

● See December FLYING for the story of a runaway Aeronca and a pilot who says he "out-Gizmoed Gizmo."—ED.

THE SHERIDAN CHARACTER

Who is this Sheridan character and where does he get his dope?

The CAA has no intention of closing down the old beam stations when they get a few VHF stations in operation. They plan to work both systems simultaneously until the transition can be made conveniently for all concerned. Also, the National Aeronautical Corporation is now formulating plans to build and retail a "Comical" direction receiver [see "Logging Time with Hy Sheridan," September FLYING], installation included for $500—not $1,000.

Why always pick on the CAA? . . .

Hy, I love your comedy but your statistics stink!

M. W. HENKEL
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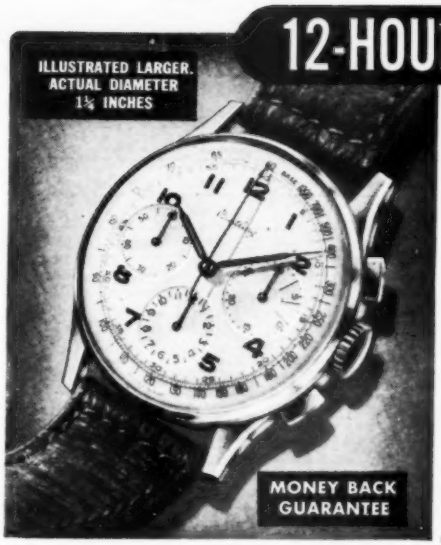

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AERONCA Chief, 1946. 65 hp, 100 hrs. Excellent condition, $1300. Dr. F. Vaclav Vesely, Lewellen, Nebr.

AERONCA Chief NC9799E, perfect condition, always hangared, 145 hours total time, radio, new federal skiis, starter, $1300.00 delivered within 500 miles. M. E. Allison, Penn Yan, New York. Phone 12.

AERONCA "K." 380 hours. Just recovered, reupholstered, relicensed, July 1949. A-1 shape. $500. E. Mettey, Route 5, Danbury, Conn.

AERONCAS. Must make room for the new Cessnas. No reasonable offer refused for any or all of three Aeronca Super-Chiefs. NC 36554, 1941, recently recovered grade A fabric, 1350 hours, 310 on factory rebuilt Continental 65. NC86237, 1946, 750 hours on aircraft, 6 hours since major on Continental 65 engine. NC34531 1941, 1220 hours, 170 since major on Cont. 65. Needs recover except tail group. $500 will buy this fine cross-country ship. All three have auxiliary 8-gallon tanks. Write or wire Inland Lake Flying Service, Cessna Dealers, Cadillac Municipal Airport, Cadillac, Michigan.

AERONCA, Super Chief, 1942 model, approximately 500 hours, excellent condition, new fabric, licensed sea or land plane. Hangared at Goodrich Hangar, Akron, Ohio. Any bona fide offer considered. L. J. Fageol, owner, 850 W. Main St., Kent, Ohio.

AERONCA Chief 65, Continental Engine, never cracked, ship and Engine in excellent condition, $1000. George Shaffer, Towanda, Pa. R. D. No. 5.

AERONCA Chief 46 just relicensed, clean throughout, pants, $1550. Willis F. Haase, 7203 33rd Ave., Kenosha, Wis.

'46 AERONCA Champion. Always hangared. Real bargain. Contact Wendell Yingling, 237 Centennial Ave., Hanover, Pa.

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BONANZA. Real bargain, 1947 No. 3229V. Only 90 hours total. Full equipment. Always hangared, never cracked, one pilot. All bulletins executed. Perfect, new condition. Asking $7600. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

BELLANCA

BELLANCA. No. 87819. Always hangared. Never cracked. Brand new clean condition. Only 33 total hours. Radio, gyros, aeromatic propeller, seat chutes, latest soundproofing, mufflers, etc. $3950. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

BELLANCA Senior Cruisair, Number 86730. A clean ship with hand-rubbed finish, complete blind flight instruments, Aeromatic prop, clock, two-way Motorola radio with loop, cigarette lighter, ash tray. Just relicensed in July. Total time 175 hrs. This is a real buy at $4000.00. Will deliver for expenses. Write Carl B Everett, Box 1086, Gladewater, Texas.

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CULVER V, 195 hours. Relicensed, radio, etc. $1650. 1543 Salem Road, Albany, Oregon.

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ERCOUPE

ERCOUPE, late 1946, Bendix 2 way radio, navigation lights, self starter, relicensed in July 1948, all bulletins complied with, excellent mechanical condition, $1675.00. Buying larger plane. Albert R. Baird, 309 Cutler Bldg., Rochester 4, N. Y.

ERCOUPE, 1946. 50 hours total time, 2 way radio. All bulletins, will sell for best offer or trade for new car. LCDR. Viall, 1619 Noyes Drive, Silver Spring, Md.

ERCOUPE, 1946. Plane is attractively painted in red, cream and black combination. Equipped with sensitive altimeter, metal prop, two-way Motorola Avigator radio, skiis. Approximately 200 hours. Privately owned, never scratched, always hangared. Sacrifice at $1,995. Write Mr. James Phillips, 2227 Jane Street, Pittsburgh 3, Pa.

1947 ERCOUPE, Harvey-Wells radio, hangared, 225 hrs. time, price, $2200. Sylvan Nylander, Dodson, Mont.

ERCOUPE 1946, licensed, 100 hours, 100 hour check, all bulletins complied with, excellent condition. $1800. Delivered free anywhere Dietrich A. Jenny, RCA Laboratories Princeton, N J

ERCOUPE, Model 415-C. Less than 500 hours, excellent condition, just relicensed. Hangared at Goodrich Hangar, Akron, Ohio Any bona fide offer considered. L. J Fageol, owner, 850 W. Main St., Kent Ohio.

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FAIRCHILD P.T. 26. 200 H.P. Ranger 79246NC less than 100 hours, never damaged. $800. Arthur L. Motter, Lancaster, Wis.

PT 19A PERFECT condition. Just relicensed All instruments, Rec. & Intercom. 368 hrs. airframe. Must sell. $775 W. Hargrove, 24 Warner St., Newport R. I.

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WIDGEON No. 61896. Built 1944. Total time airframe and one engine 67 hours. Second engine just majored, new fabric, and ship repainted. Completely equipped. Top condition. Asking $15,000. Apply Powers & George, 475 Fifth Ave., New York, N. Y.

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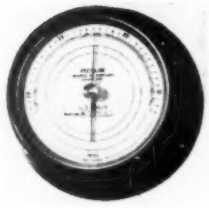

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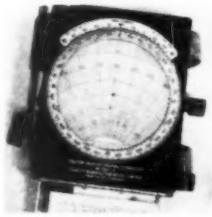

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A page of service tips for private flyers and fixed-base operators

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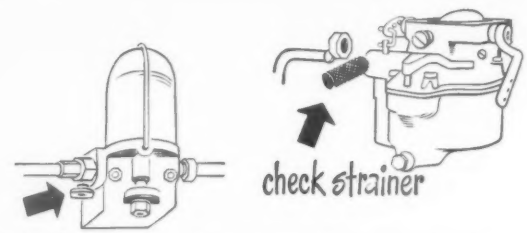
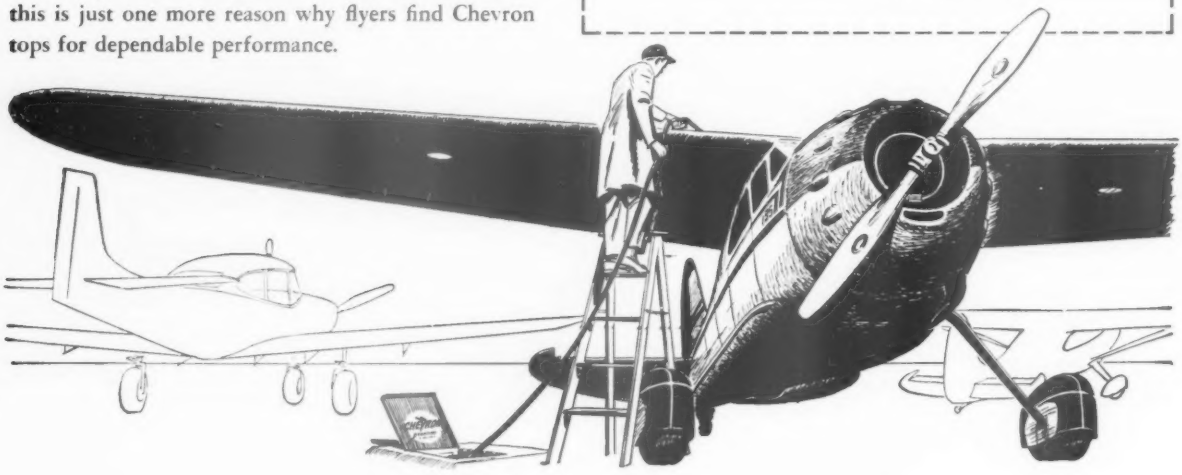


How to avoid contamination in fuel systems!

Dirt and water in your fuel system can prove just as embarrassing as an empty tank. That's why, to avoid the possibility of trouble in the air, check your filter bowl and strainers and drain tank sumps frequently.



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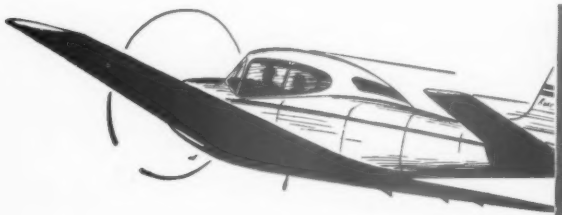

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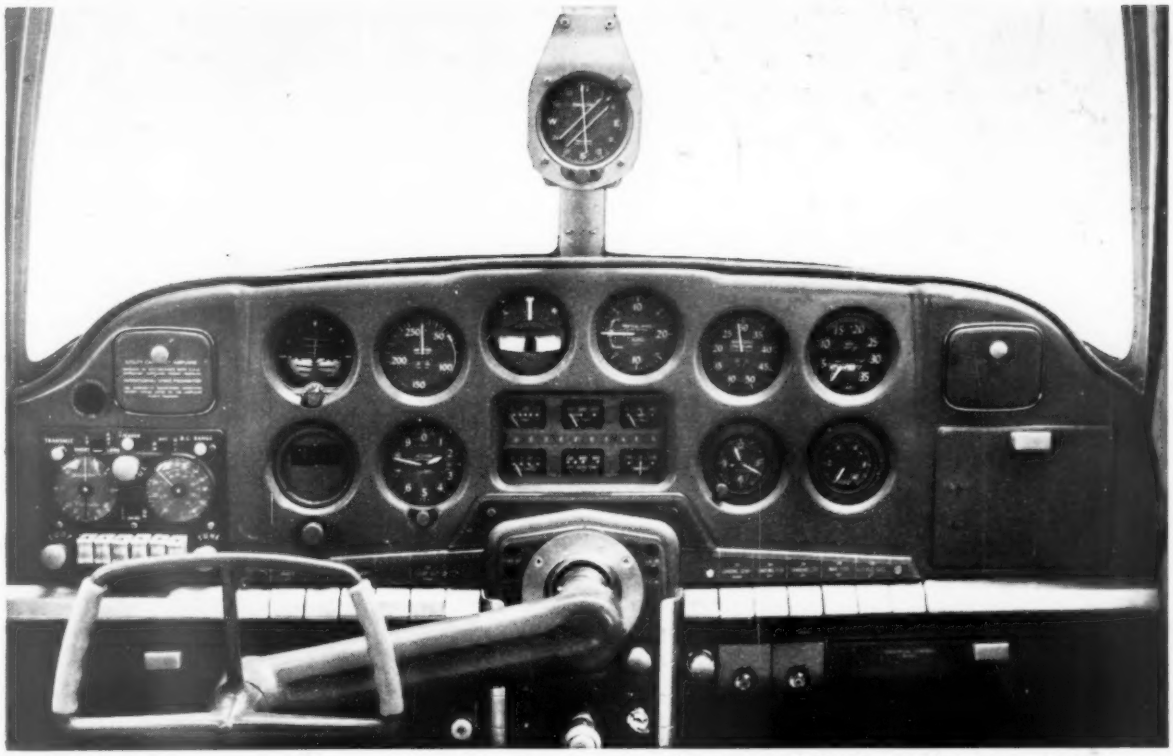

(Bonanza panel showing complete instrumentation)

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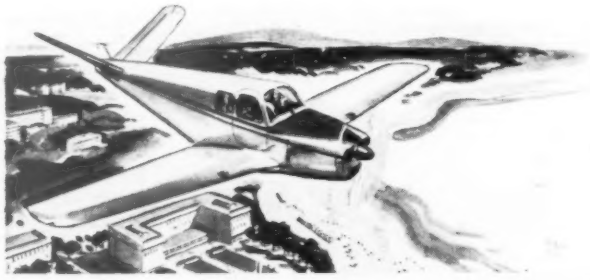

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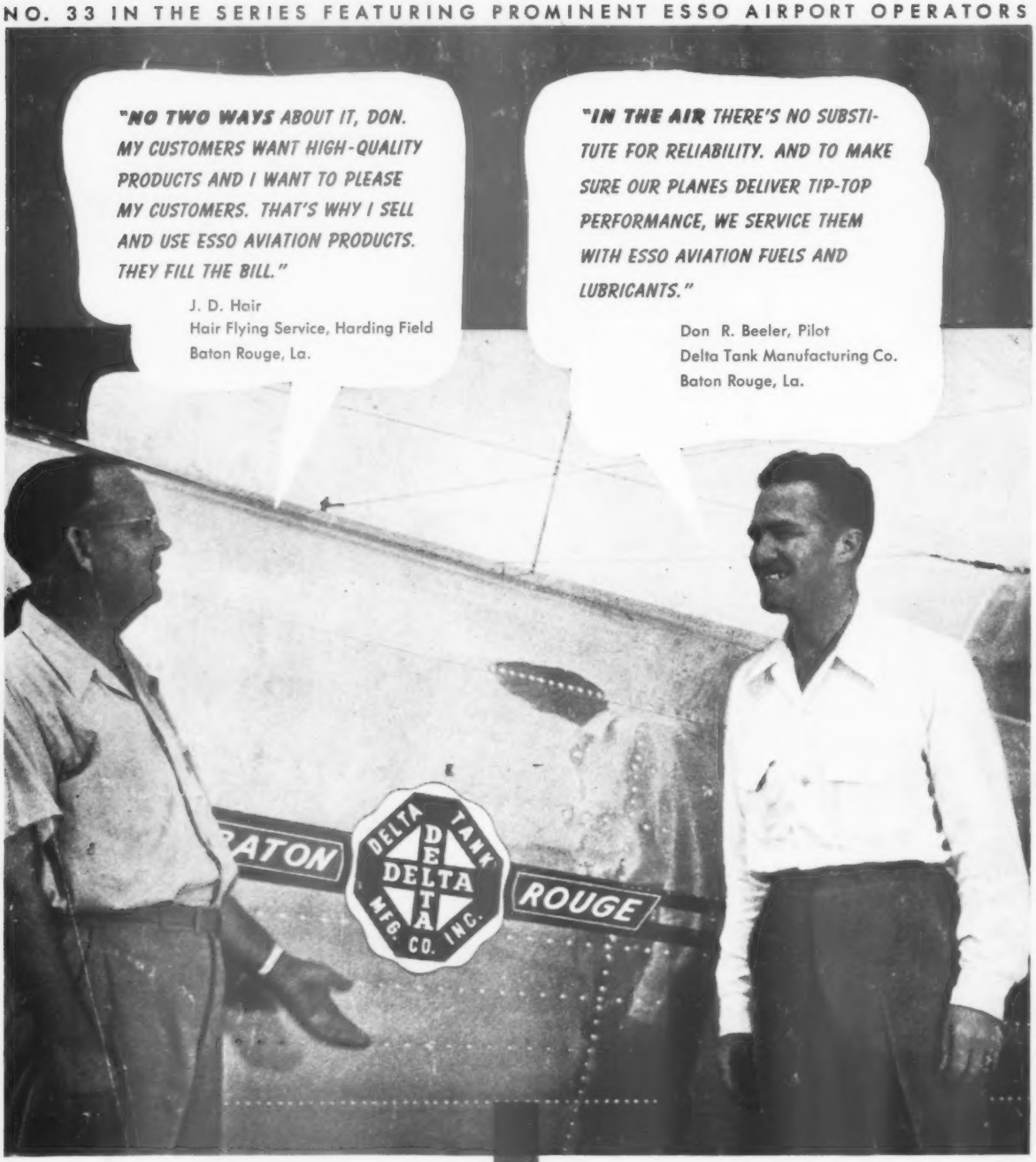
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